THE IRON AGE

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Planning Work Ahead in the Foundry

Methods to Insure Delivery of Castings on Time and to Facilitate Molding and Pouring with Minimum Labor and Material Waste

A LARGE foundry in the Middle West has effected great economies in labor and material by means of a system of planning the work ahead for the molders and of routing the pouring gang to a definite, predetermined sequence of molds. The foundry in question is an adjunct of a manufacturing company which operates in addition a machine shop, a structural shop and a pattern shop. The total force employed is nearly 1000 men, and there are about 150 men in the foundry. The castings made range in size from a few ounces in weight to 10 or 15 tons. The bulk of the work is in green sand, although there is a fair proportion of it in loam. There is sufficient duplicate work to warrant the employment of several molding machines. About one-half of the work is standard, the rest being made to specifications. The standard work, however, varies in volume and comes along at irregular times, so that it is not possible to assign any group of molders to a particular line of work.

JOB TICKET

Man's No._____

Date issued_____ Date castings are wanted_____

Order No._____ Quantity_____ Weight per piece_____

Pattern No._____ Drawing No._____ Material_____

Description _____

Class of work No._____ Day work_____ Piecework_____ Bonus

Floor No._____ Machine No._____

Man's rate_____ Rate per piece_____

Preparation time allowed_____ hr.

Time allowed per piece_____ hr.

Total time allowed_____ hr.

Total Previously Finished	Finished Today	Total Finished to Date	If job is finished scratch out—→	N. F.
			If job is not finished scratch out—→	F.

	Time Taken	Overtime Allowed	Total Time	Bonus	Man's Earnings
Stopped work					
Started work	hrs.	hrs.	hrs.		

Signed by_____
Foreman

Fig. 1.—Face of Job Ticket

EQUIPMENT

No.	Flasks	Size	Remarks
	Boards		
	Clamps		
	Gaggers		
	Chaplets		
	Core Box		
	Nails		

Special Instructions:

Fig. 2.—Reverse of Job Ticket

The job ticket carries all the necessary information for the completion of the work. The central planning room gives the date on which the castings are wanted, the number, the material, the pattern and drawing numbers, and, if necessary, a description. The foundry office classifies the work, sets the rates, lists the equipment and writes such special instructions as are needed. It then schedules the work and assigns it to the molder. The time stamp enters the time in hours and tenths of an hour.

PLANNING THE WORK AHEAD

The different molders have been divided into classes according to their skill and the character of work for which they are best fitted. The work is also classified according to its intricacy and the method to be followed in doing it. This is done by the foundry superintendent, and the foundry planning room then assigns to the different jobs the molders fitted to the class of work in hand, who are available at or before the time when it will be necessary to begin work on the castings. As a large proportion of the product of the company is based on contracts calling for definite delivery dates, it is essential that the foundry begin work on the castings required for any particular order in ample time for them to be delivered to the machine shop in accordance with the schedule laid out for that department of the works. To accomplish this, the work for all departments of the plant is first laid out in the central planning room, and the castings are started in the foundry according to the general schedule, which co-ordinates the work of the several departments.

The general schedule contents itself simply with the assignment of the work, giving the date at which

the castings must be delivered to the machine shop. In doing this it, of course, takes cognizance of the work already assigned and of its relative importance, so that the foundry will not be loaded with work beyond its capacity for delivery on any one day, and also that important work for early delivery will not be delayed by work that can be side-tracked for a few days if necessary. The foundry planning room proper is entrusted with the details of laying out the work so that it will be delivered on the day called for.

The job tickets for the foundry are made out in duplicate in the central planning room, for the reason that the facilities for doing this part of the work for all departments of the plant can be most conveniently located there and the duplication of equipment avoided. The job card, shown in Fig. 1, carries all the necessary information for the assignment of the work by the foundry planning room. It also has spaces in which the foundry planning room enters the information required by the molder, and other information needed to carry out its part of the contract. On the reverse of the job ticket are written the specific instructions that the molder may need for the particular job, and also a list of the equipment that he will need.

The central planning room fills in the date of issue, the date on which the castings must be delivered, the order number, the drawing number, the pattern number, the number of castings, the weight per piece and the description of the work, and sends the tickets to the foundry. The foundry superintendent then determines, by the aid of the drawing or pattern, if necessary, the class of work, and also whether or not the job is to be done by day work, bonus or piecework. He indicates these facts by entering the number of the class in the proper space and by scratching out the words "day work" and "bonus," if the job is to be done by piecework, or by scratching out "piecework" and "bonus," if it is a day work job. Similarly, for a bonus job, "day work" and "piecework" are scratched out. Each class of work has a number, and molding machine work is divided into several classes according to the type of machine best adapted to the job. The job tickets go from the superintendent to the foundry clerk, who assigns the work to the individual molders and to the specific floor or machine where the job is to be done.

The rates used in the foundry for the payment of the molders have been based on time study, and for nearly every casting that has to be made there is either a rate already set or data are available from which a rate can be made up. In the case of piecework jobs, the price per piece is entered on the job ticket, together with a time allowance for preparation, such as changing a molding machine, getting flasks, clamps, gaggers, etc., and doing such work as may be necessary aside from the actual molding operations. This preparation time cannot be figured in the piece rate for the reason that it is usually a fixed quantity, irrespective of the number of pieces, and would be the same for one piece as for 100.

If the job is to be done under bonus, the time study will indicate the amount of time that the man is allowed for the completion of the work in order to earn his bonus. As before, the time allowed for preparation is entered as a separate item. The total time allowed, that is, the sum of the preparation time and the product of the time per piece multiplied by the number of pieces, is also entered. If the job is one on which it is not possible to set a piece rate or to fix a time for its completion, the job goes as day work and the entries as to rates and time allowed are omitted.

ROUTING THE WORK TO THE MOLDER

These entries having been made and the instructions filled in on the back of the ticket, it is then posted with its duplicate on the bulletin board against the floor or machine where the work is to be done. The bulletin board enables the foundry clerk to ascertain at a glance the exact quantity of work assigned to each floor or machine at any time, and so to apportion the work as to enable it to be

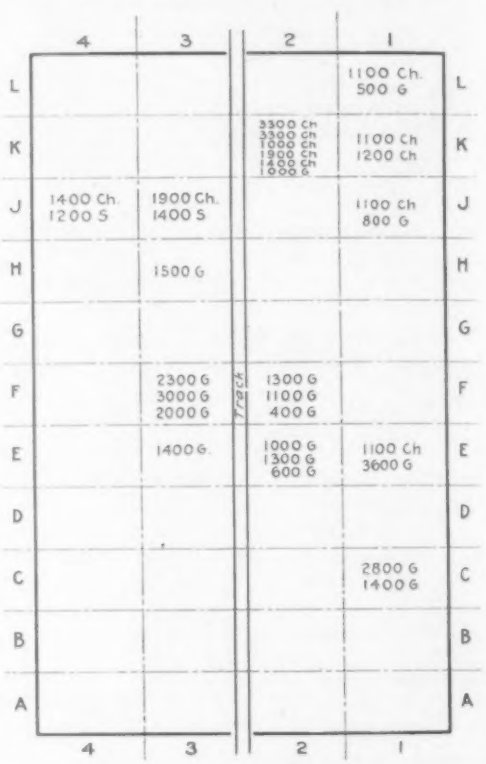


Fig. 3—In Making Up the Pouring Schedule the Foundry Clerk Uses a Sheet Ruled to Show the Various Floors, and He Enters in Each Floor the Weight of Each Kind of Iron that is to Be Drawn from the Different Ladles. In the above diagram *Ch* represents chill iron; *G*, gray iron, and *S*, separator iron

accomplished with the greatest facility. The orders are posted on the board in the sequence in which they are to be finished, due regard being paid to the dates of delivery called for by the central planning room.

A small supplementary bulletin board indicates where the work for the different men is posted on the main board. This supplementary board has a series of clips, one for each man. When a job is assigned to a certain floor or machine, and the man who is to perform it is decided upon, the number of that floor or machine is written on a small slip of paper and placed in the clip on the supplementary board opposite the man's number. When the man turns in his job ticket for the previous job, the top slip is taken from the clip opposite his number on the supplementary board, and the location of his next job ticket on the main board is shown. The job ticket is given to the man, and the slip bearing the man's number and the job number replaces it on the main board, to indicate that that particular job is under way in the foundry. The duplicate ticket remains on the board until the completion of the job.

As a rule, the job tickets come in to the foundry clerk from the central planning room far enough in advance to enable him to post in the afternoon all of the work for the next day. While doing this he makes a list of all the patterns and core-boxes required, and sends the list to the pattern storekeeper. The patterns and core-boxes are gotten out before quit-

ting time, and are sent to the foundry office, where the men get them at the same time as they get their job tickets, if they are of small size. If the patterns are of large size, they are sent directly to the floor where they are to be used. The men procure their other equipment from the foundry storeroom, being guided in this by the list on the back of the job ticket.

The men turn in their job tickets every night, scratching out the "F" or "NF" at the bottom of the ticket to indicate whether or not the job is completed. Each man starts with a new ticket every morning. If the job is unfinished, the particulars are copied to the new ticket, and total number of pieces finished is entered. This may seem like a useless duplication of labor, but as the great majority of jobs are finished on the same day that they are started, the percentage of tickets that have to be rewritten is comparatively small, and the labor expended in writing them is more than balanced by the advantage of having each day a complete statement of the previous day's work. The time that the man starts and stops work is entered on the card by a time stamp, this also showing the date.

MAKING OUT THE POURING SCHEDULE

The foundry is divided by the rows of columns and the railroad track down the center into molding floors, each of which has a symbol. The longitudinal bays formed by the columns and the railroad track are numbered from 1 to 4, and the lateral bays are lettered from A to L, as shown in Fig. 3. The symbol of the floor is made by combining the number and the letter of the longitudinal and lateral bay in which it is. Thus the floor that is in the second longitudinal and the fifth lateral bay would be known as Floor E2.

Toward noon every day the foundry clerk makes out the pouring schedule. Certain of the molds have chills in them, and will require a chill iron, while the rest will be poured with gray iron, or with what is termed "separator"; that is, the iron that comes from the cupola between the chill and the gray iron. Certain molds may require iron of a special analysis, and this is taken care of by the pouring schedule, but for purposes of explanation it will be sufficient to consider only the chill, gray and separator iron. The object of the pouring schedule is to insure that each mold receives the kind of iron needed for it, that no molds are overlooked, and that each ladle of iron is completely utilized so that there are no skulls to be disposed of after pouring.

Man's No._____ POURING CARD

POURING MOLDS AND WAITING FOR METAL

This card is to cover the molder's time from the time of closing the last mold, until quitting time only. If pouring-off is not finished when the whistle blows, molder will receive an overtime card.

	Total Time	Man's Rate	Man's Earnings
Stopped			
Started			

Signed by_____

Foreman

Fig. 5.—After the Man Closes His Last Mold He Is Paid Day-Work Wages Until Quitting Time

POURING SCHEDULE

Tap No.	Kind of Iron	Weight to Tap Out	Size of Ladle	Pour Molds with Tag Colored	Pour Molds on Floor No.	Remarks
1	Gray	3700	4000	Yellow	E3, F3	
2	Gray	2300	2800	Yellow	F2, E2	
3	Chill	3300	4000	Green	K2	
4	Chill	3300	4000	Green	J1, K1, L1	
5	Chill	3300	4000	Green	K2	
6	Chill	3300	4000	Green	K1, E1, K2	
7	Chill	3300	4000	Green	J4, K2	
8	Chill	3300	4000	Green	J3, K2	
9	Separator	2600	2800	Red	J4, J3	
10	Gray	2300	2800	Yellow	J1, K2, L1	
11	Gray	2800	4000	Yellow	C1	
12	Gray	2400	4000	Yellow	F2, E2	
13	Gray	3000	4000	Yellow	F3	
14	Gray	3600	4000	Yellow	E1	
15	Gray	3500	4000	Yellow	F3, H3	
16	Gray	1400	2800	Yellow	C1	
17	Gray	1000	2800	Yellow	F2, E2	
18	Total	48400				
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

Blast on 2.00 p.m.
Iron on Floor 2.20 p.m.

Fig. 4—The Pouring Bulletin Shows the Kind and Amount of Iron to Be Tapped in Each Ladle and the Location of the Molds Where It Is to Be Used

From the bulletin board the foundry clerk ascertains the weight of castings being molded on each floor, and the weight of metal of each kind that will be needed on the various floors at pouring-off time. He has a sheet ruled to represent the floors, as in Fig. 3, and on this sheet he enters the weights of each kind of iron required for each floor. He then subdivides these totals into ladles of iron and fractions of ladles. Two sizes of ladle are in use at the cupola, the respective capacities being 2800 and 4000 lb. He aims to use as many full ladles as possible on a floor, and to use the unexpended balance from the last ladle in the molds requiring the same quality of iron on the nearest floor.

For instance, referring to Fig. 3, it will be observed that floor E3 calls for 1400 lb. of gray iron. If 3700 lb. are tapped from the cupola into a 4000-lb. ladle, floor E3 can be poured with this ladle, which will then have 2300 lb. available for some other floor. Floor F3 calls for 7300 lb. of the same kind of iron, and the 2300 lb. can be used there. The remainder can be obtained by means of a single full ladle holding 3000 lb. and 2000 lb. from a ladle containing 3500 lb., the balance being used for the 1500 lb. required on floor H3. The entire foundry is gone over in this manner and the amount of iron that is to be taken from each ladle is entered on the sheet, as shown in Fig. 3. From this sheet the clerk posts to a pouring bulletin board the pouring schedule.

THE POURING BULLETIN

The pouring bulletin board comprises a large blackboard placed alongside of the cupola and divided into seven columns, as shown in Fig. 4. The third column shows the amount of iron that is to

be tapped into the successive ladles, while the fourth shows the size of ladle that is to be used for each tap. The molds are all tagged with a colored card by the molders to signify the kind of iron with which they are to be poured, and this information is posted in the fifth column of the board. Thus all molds to receive gray iron are tagged with a yellow card, those requiring separator iron have a red tag, while a green tag calls for chill iron. The sixth column shows on what floors will be found the molds in which each particular ladle of iron is to be poured. The seventh column is ordinarily left blank, but is available for special instructions regarding the disposition of any particular lot of iron.

By comparing the layout sheet, Fig. 3, with the bulletin board, Fig. 4, it can easily be seen how the pouring is scheduled to fill all the molds with the least amount of travel for the iron, and with a minimum of waste of metal in the form of left-over and skulls. The layout and the pouring schedule presented herewith were taken from an actual case representing a single afternoon's work in the foundry in question.

It is quite evident that the method described could be applied to routing many different analyses of irons to the molds, as the charging schedule is made up from the pouring schedule. The foundry superintendent prepares this, adding to the quantities of iron called for by the pouring schedule the proper percentage to cover the melting loss. He lists in the order that they are to be charged into the cupola, the various weights of coke and the weights of the different analyses of iron and scrap, so that the required grades of melted iron will be available at the tap-hole in the order called for by the pouring schedule. The charging schedule is placed on a blackboard on the charging floor, and as each charge is made that item is cancelled on the board. By the establishment of a regular routine of load, weigh, charge and cancel, it is next to impossible to make a mistake in the charging, and thus throw out the pouring schedule.

The pouring proceeds with an entire absence of confusion. The metal is tapped from the cupola in the large ladles and conveyed to the various floors by traveling cranes. If there are a number of small molds to be poured the ladle is suspended on brackets under the crane runway and hand ladles are filled from it, or it is transferred to hand-traveling cranes for the purpose of pouring larger molds. There is no necessity for the shouting of orders, nor is there any getting in the way of one another on the part of the molders. Their instructions are in plain sight, every man knows what he is to do, and when, and he does it without any interference on the part of his foreman or anyone else.

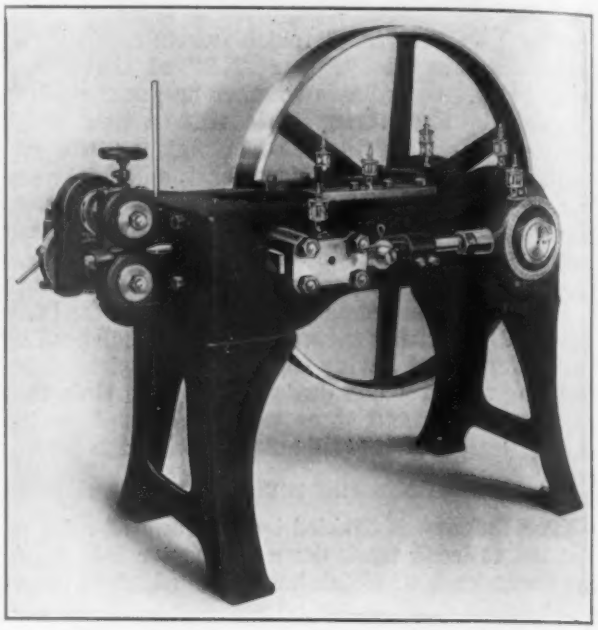
When a molder has closed his last mold preparatory to pouring, he turns in his job ticket and receives the pouring card, Fig. 5. This covers the time required for pouring off. When his molds are poured he is at liberty to go home. The shaking out and cleaning up preparatory to work for the next day is done by laborers after the molders have finished work.

Pure Iron Stands a Severe Test

The expanded metal reinforcement, made of pure iron, for the walls of the Galveston Jetty Light Station, Texas, which was put in position prior to the hurricane of Aug. 16-17, 1915, and the greater portion of which is uncovered, shows, on examination recently by the U. S. Bureau of Lighthouses, that it has not been impaired by this exposure. The deterioration has been little or none and the iron is reported to be in probably as good condition as when installed. Specifications for the expanded metal called for pure iron instead of steel.

Heading Machine with Friction Feed

An improved form of heading machine equipped with friction feed has been placed on the market by the Asa S. Cook Company, 603 Franklin Avenue, Hartford, Conn. The friction feed is to provide that exact lengths of stock are fed on every stroke of the feed



Heading Machine Equipped with Friction Feed and an Arrangement That Prevents the Cutting-Off Device from Operating if There Is Any Pressure on the Punch

arm. The cut-off mechanism does not work while there is still any pressure on the punch.

With the friction feed the operator regulates the amount of stock required to make a full head without fin or flash on the edge, and this may be done when the machine is in operation. The machine may be started or stopped at will on the back stroke of the feed arm, thus eliminating another source of waste in short or so-called bung heads. The adjustment of the friction is relied upon to prevent breakage if the blanks should stick in the dies, as slipping occurs in case of an unusual stress. The stop has been omitted on this machine, and this fact, it is explained, reduces the wear on the feed roll. In cases where a stop is employed it has been found that the operator is apt to depend upon it entirely and feed too much stock, causing the wire to slip between the feed rolls, thus wearing them out of round and rendering them unfit for use.

New Foundry Equipment Firm

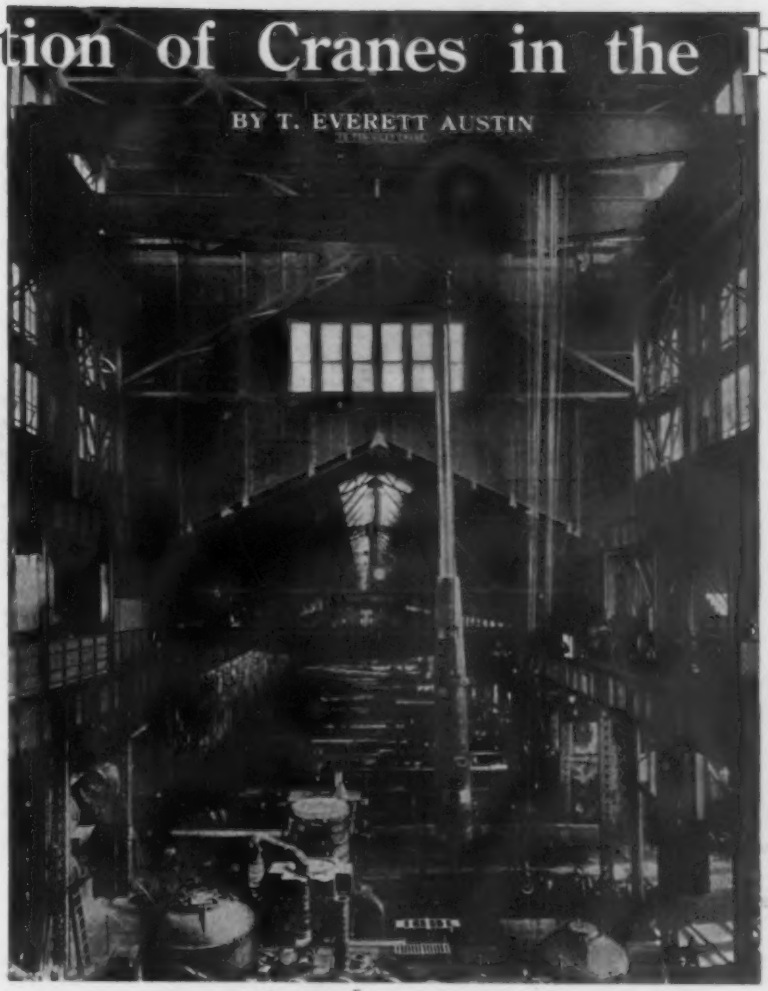
Leyshon & Lane, Inc., is a new company organized to take over the oven and special foundry equipment business which has grown out of H. M. Lane's foundry research work. The H. M. Lane Company was organized several years ago to do foundry consulting work and to design new foundries. It was not the intention to make it a contracting or manufacturing organization, but various devices and equipment were developed, some of them being patented by H. M. Lane, particularly the forced draft core and mold oven system. Leyshon & Lane, Inc., will contract for complete foundry installations, melting furnaces, annealing ovens, core ovens, mold ovens, and handling appliances. T. A. Leyshon, associated with H. M. Lane for several years, is president, and C. T. Holcroft, who has been engaged in furnace building for many years, is treasurer. The new company has made arrangements for a portion of H. M. Lane's time as consulting engineer. The H. M. Lane Company will continue as a consulting organization.

Hydroelectric power available in Spain, according to recently compiled statistics, is estimated at over 5,000,000 hp. There are 110 large hydroelectric plants employing 281,490 hp. which, with many small ones, makes the total in use at about 300,000 hp.

Application of Cranes in the Foundry

BY T. EVERETT AUSTIN

Wall Type as an Effective Adjunct to the Overhead Traveling Crane—Some Notable Installations



Crane of 80 Tons Capacity and a Lift of 140 Ft., Designed to Allow the Gun to Fall by Gravity if Necessary

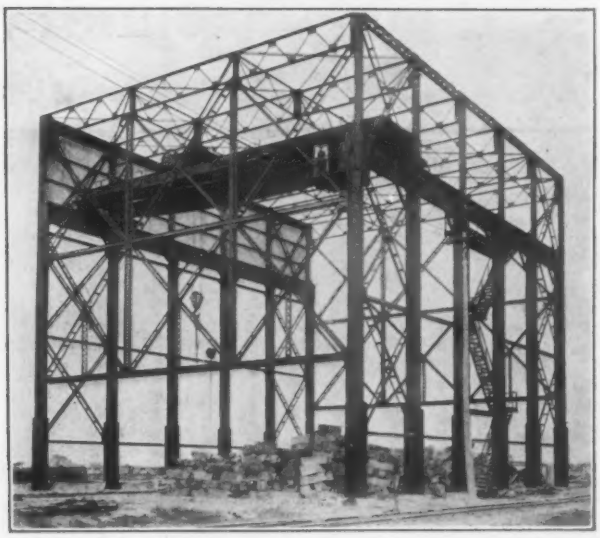
JIB cranes, in special cases, are undoubtedly handy and desirable in the foundry, and it is not at all surprising that the advocate of their exclusive use still lingers with us. The limitations, however, of this type of crane are self-evident—one of the most serious being its non-flexibility and limited range, confining all operations within its fixed radius, notwithstanding the congestion and delay that in sudden emergencies or rush of orders are the inevitable results.

Careful investigation, consideration and practice have demonstrated that if only one crane can be purchased, it should by all means be an overhead traveling crane, and if its financing can be accomplished, it should be an electric overhead traveling crane. This type of crane is the most efficient, adaptable and flexible unit in the foundry. The electric traveling crane is recognized as one of the greatest factors of economy in modern manufacturing methods. The large output of such industries as the iron or steel foundry, the steel mill and the machine shop of to-day would be impossible without this most rapid and efficient method of handling material.

One of the first principles of the design of an overhead traveling crane must be safety; that is, it must be able to handle a load up to its rated capacity with a large margin of reserve strength to compensate for wear, use and abuse, so as not to endanger the life and limb of the operator or the men working beneath the crane by failure of the compon-

From an address before the Newark Foundrymen's Association, Newark, N. J., May 3. The author is assistant manager, crane department, Niles-Bement-Pond Company, Philadelphia.

Special Crane Used by the Fort Pitt Malleable Iron Company, Pittsburgh. Scale weighing device is incorporated in the lifting mechanism



Supporting Structure for a 40-ton Skull-cracker Crane in Use by the American Rolling Mill Company, Middleton, Ohio

ent parts or inadequate protection of the operator. Second, the crane should be quick-acting, responding immediately the current is turned on, so that all movements of the crane can be used simultaneously, obviating lost time in the prompt handling of materials. Third, the crane should be efficient, in that if called upon to operate continuously for a long period of time, it should be able to stand up to the work with the minimum delay for repairs or attention; therefore proper lubrication and generous wearing parts carefully protected from dust and mechanical injury should be provided.

The regulation, or control, of the various movements of the crane should be such that the setting of a core, the lifting of a cope or the closing of a mold can be done with exactitude and ease, or the mold shaken out, and the hot metal or casting, as the case may be, quickly transported to its desired location, leaving the crane free in the shortest possible time to do such other duties as it is called upon to perform. All parts of the crane should be accessible for examination or repair, and each distinctive part readily removable when necessary. These parts should be compact so as to be easily handled, considering the location of the crane.

Dynamic braking was originated by the Niles Company, and first introduced on cranes some years ago. We are now building a 30-ton crane controlled with the Niles dynamic braking system, for use in a gun tempering plant, which will lower a 30-ton load without acceleration under complete control at a speed of 180 ft. per minute.

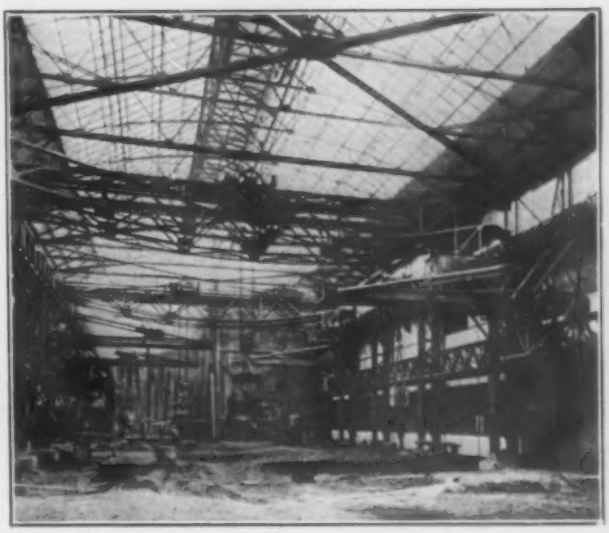
An interesting installation is that at the Deemer Steel Casting Company, New Castle, Del. The problem was to convert an old textile mill building into a steel foundry. This was accomplished by raising the roof over a portion of the old building, in which were installed two overhead electric traveling cranes. The converters and core ovens were placed on one side of this part of the building. To utilize the part of the building which had a low

Handling a Big Gun with a 110-ton Niles Crane at the Washington Navy Yard. Overhead is seen a second crane for lowering into a pit

ceiling (supported by a row of columns down the center) a continuous I-beam track was installed running around the entire building, including the remodeled high section. On this track were placed two Niles mono-rail trolleys, which are used for transporting all the materials, including patterns, flasks, hot metal, etc. In pouring the castings it is necessary to place the molds directly under the I-beam track, but this limitation is not a serious objection to the rapid handling of the work, and has proved satisfactory in practice.

The Erie Foundry of the General Electric Company has in use in its raw material bay a Niles crane with grab bucket trolley, the latter a modification of the mono-rail trolley previously referred to. This modification consists in merely arranging the parts to suit a standard crane, and with an additional hoist for the lifting magnet. I understand this is one of the largest foundries with the lowest cost of melting iron in the United States. This one crane handles all raw materials, pig iron, coke, sand, etc. I do not suppose that any single crane installation has ever attracted more attention.

The traveling wall crane has been found by experience to be the most effective adjunct to the overhead traveling crane. One of the accompanying views illustrates four Niles wall cranes in the General Electric foundry at Erie. They travel by power along the wall, and have the regular hoisting and trolley movements. The effective, practical reach or projection into the shop is about 20 ft. They can

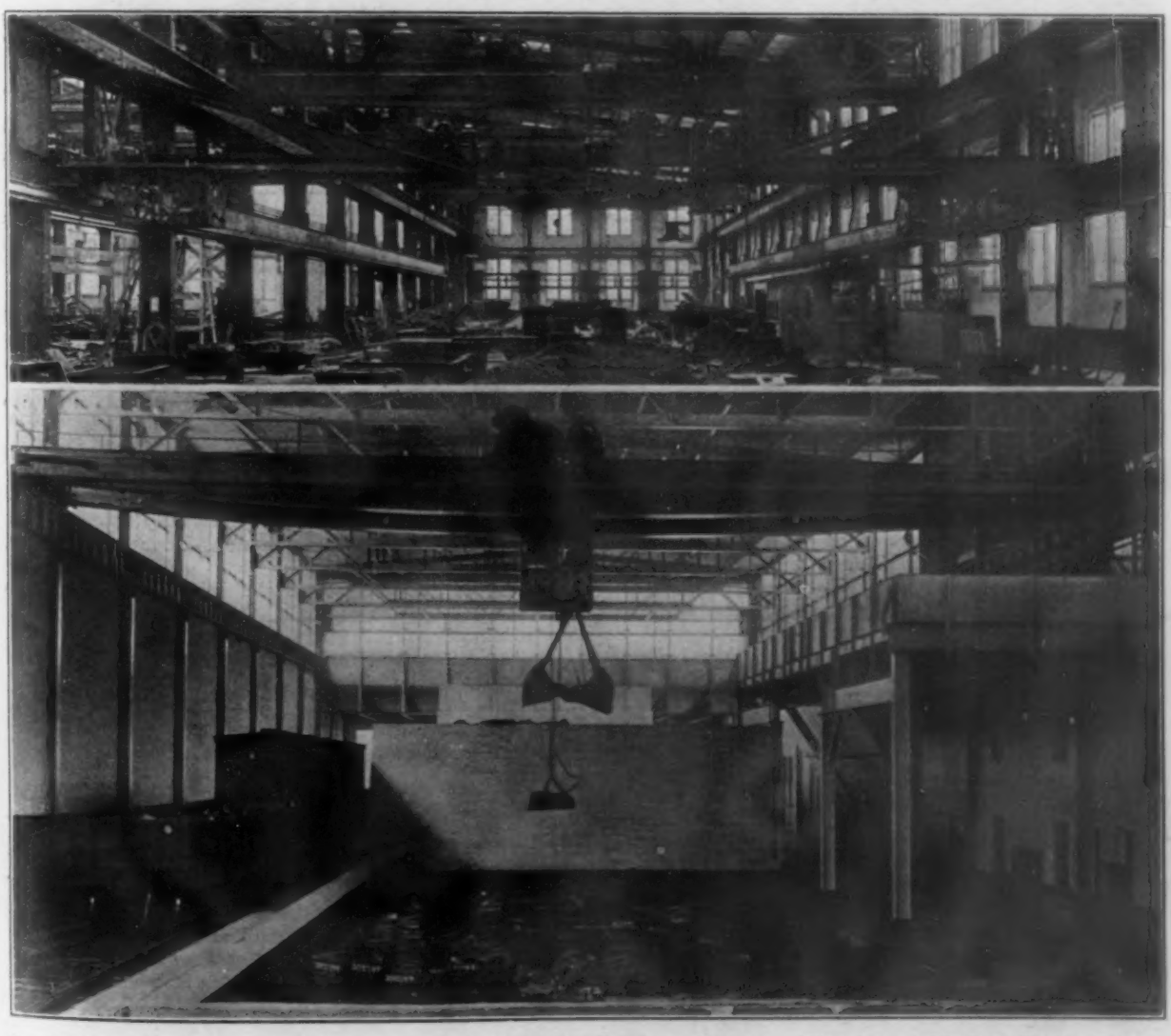


View of a German Foundry. Note Broad Expanse of Skylight Area, also Lattice Work Construction of the Crane Girders

be controlled from a cage or from the floor as desired.

A special crane in the yard of the Fort Pitt Malleable Iron Company has a scale weighing device incorporated in the hoisting mechanism, so that all material handled can be accurately weighed by the crane operator in the cage, and a printed record

Four Overhead and Two Wall Cranes in the Modern Foundry of the Niles Tool Works, Hamilton, Ohio



Raw Material Bay of the Erie Foundry of the General Electric Company, Showing a Niles Crane with Grab Bucket Trolley and Lifting Magnet

of the weight registered at the time the lift is made.

The gray iron and wheel foundry of the Norfolk & Western railroad at Roanoke, Va., has in operation three cranes with lattice construction girders and four wall cranes, two on each side of the building. Both gray iron and carwheel castings are made in this foundry. In the foreground of the illustration herewith is shown a special design of wall crane, each crane having four independent hoists, so that four carwheels can be handled at one time. The wall cranes in the rear are standard construction with single hooks for gray iron work.

It is interesting to compare the Norfolk & Western installation with another to be found in a German iron foundry. The design of the lattice girder cranes and the wall cranes is very similar to that of the Roanoke installation, although the German cranes antedate the American by several years. We must acknowledge that the world has been astonished by German industrial efficiency, but is it to be wondered at when we see the complete equipment with which their shops are provided? Is it any wonder that their men are efficient when they work in such a well lighted foundry as that illustrated?

We have found, however, that so much glass overhead is not without its faults. In one of our shops which had an extremely large area of skylights, we found that the rays of the sun made working conditions almost unbearable in summer weather and we were compelled to stretch muslin over the glass to protect our workmen. Better results are probably obtained with a reasonable amount of overhead lighting, augmented by good light from the sides.

In view of the extent to which preparedness is now agitating the public mind two interesting illustrations which are given here demonstrate that our government has made some provision in this direction. One is a view of the gun shop at the Washington Navy Yard, with a 110-ton Niles crane handling a big gun. Up in the roof will be noted another crane, an 80-ton Niles crane, which is shown in fuller detail in another halftone. This latter crane has a lift of 140 ft. Communication is maintained between the crane operator and the men in the pit by telephone. Provision has been made to lower the gun by gravity should the power be shut off.

Gray Iron and Carwheel Foundry of the Norfolk & Western Railway, Roanoke, Va., in Which Crane Girders Have Lattice Work Construction

Using Powdered Coal on Locomotives

The powdered coal committee of the International Railway Fuel Association made public a report on May 15 at Chicago, expressing the opinion that the effectiveness and utility of the use of fuel in the pulverized form has been demonstrated from the past year's developments. The results obtained in locomotive service are summed up as follows:

Smokeless, sparkless and cinderless operation.

Maintenance of maximum boiler pressure within a uniform average variation of 3 lb. without popping.

An increase of from 7½ to 15 per cent in boiler efficiency as compared with burning lump coal on grates.

Saving of from 15 to 30 per cent in fuel of equivalent heat value fired.

Enlarged exhaust nozzle area, resulting in greater drawbar pull and smoother working of locomotive.

Elimination of ashpit delays.

Reduction in time required for and ease in firing up.

Maintenance of a relatively high degree of superheated steam.

No accumulation of cinders, soot or ashes in superheater or boiler flues, smokebox, or on superheater elements.

No punishment or overheating of firebox, new or old sheets, seams, rivets, patch bolts, stay or flue beads.

Elimination of arduous manual labor for building, cleaning and dumping fires.

Expense and annoyance avoided of providing various sizes and kinds of fuels.

Elimination of the necessity of front end and ash pan inspection and for special fuels, firing tools and appliances for building fires and for stoking and cleaning fires.

Equal provision with engineer for fireman to observe signals and track, thus reducing liability of accident.

Steel merchant vessels building or under contract to be built in private American shipyards on May 1, 1916, according to builders' returns to the U. S. Bureau of Navigation, numbered 368 of 1,029,014 gross tons. Of these 221 are for salt water and 147 for fresh water. On April 1, 1916, the tonnage was 1,067,856; March 1, 945,798 and Feb. 1, 901,371. Vessels contracted for in April were 13, of which the Chester Shipbuilding Company secured 3, the Newport News Shipbuilding & Dry Dock Company 2 and the American Shipbuilding Company 2.

POWDERED COAL FOR BOILERS

What Place Pulverized Coal Will Hold—The Matter of Ash Fusibility

The use of powdered coal for stationary and locomotive steam raising, the chance which such fuel has for holding a place in industrial economics, and such matters as the fusibility of the ash in fuel came in for some attention in a paper read by Joseph Harrington, a consulting engineer of Chicago, at a meeting in Chicago, May 15, of the American Society of Mechanical Engineers. What he had to say was in part as follows:

Steam generation by the use of powdered coal as a fuel is still in the experimental stage, and herein, if anywhere, powdered coal will meet severe competition. With the exception of the Missouri, Kansas & Texas Railroad installation at Parsons, Kan., which is now being put in by the Fuller Engineering Company, all of the steam-making installations are in the plants of the manufacturers of powdered coal equipment, or in plants very directly connected therewith. That steam can be efficiently produced in this way is unquestioned if the mere matter of combustion and evaporation is considered. Whether it can be done more economically than is at present done by the best mechanical stokers, still remains to be commercially proved, and even with powdered coal gas analyses better than 16 per cent of CO_2 are not developed. With the mechanical stoker the CO_2 can be maintained around 14 per cent.

With powdered coal the loss in the ash pit and in the flue does not exceed 1 per cent, and in the best mechanical stokers will not exceed 2 per cent of the coal fired. A possible advantage in favor of powdered coal of 2 or 3 per cent in combustion efficiency is offset by the cost of fuel preparation. It is not reasonably to be anticipated that we can get better than 96 per cent efficiency, and this is a figure which can be obtained by the mechanical stoker. I foresee, therefore, a hard fight for powdered coal in stationary steam boiler practice.

It is in cases such as the locomotive that powdered coal shows most favorably. Here we have not only the single problem of combustion efficiency, but a long list of related conditions that are affected thereby. I can do no better than to refer to the summary of the report of the standing committee of the Railway Fuel Association (reviewed elsewhere in this issue).

ASH FUSIBILITY

A phase of the combustion problem, both in connection with powdered coal and mechanical stokers, which is but now receiving adequate attention, is the study of the temperatures and conditions under which ash will melt. Engineers have always recognized the fact that certain coals were greater clinker producers than others, and this was laid at the door of the sulphur content. Recent experiments, however, have shown that the sulphur is not the controlling element, although the exact causes are not yet sufficiently well known to be definitely stated.

Interesting work along these lines has been undertaken by the Commercial Testing & Engineering Company, Chicago. Coal ash will melt at temperatures between 2200 deg. and 2700 deg.

Furnace temperatures in commercial practice run between 1800 deg. and 2800 deg., so that it is possible to secure coals, the ash from which will pass through the furnace without fusing. Under these conditions absolutely no clinker formation is encountered, and the coal is rated as satisfactory from this standpoint. In exactly the same furnace another coal will clinker badly and give trouble. There is no hard and fast rule, therefore, which can be stated for the selection of a coal.

The temperature obtained in service, which is a function of the rate of combustion, the amount of excess air, and the proportions of the furnace chamber must be determined, and analyses of the fuel made to determine whether or not it will be suitable under the given conditions. Like many other scientific investigations the value of a few dollars spent in this manner is not always appreciated, and the user will tolerate the formation of clinkers for months before he turns to another source of coal supply. When he does so, he may or may not solve his problem, and it becomes necessary to purchase and consume a variety of coals before one is found which is suitable to his needs.

In powdered coal work, with the more precise and scientific manner of the combustion process, the necessity for proper knowledge of the point of ash fusibility is greatly increased. The day is rapidly approaching when the burning of coal will be considered a precise scientific chemical reaction, in which the elements are supplied with exactness and understanding, and the result obtained, corresponding in definiteness to the precision of the mixing process, will be made to conform exactly to the requirements of the service.

The Commercial Testing & Engineering Company has determined that washing a dirty coal made no difference in the fusing point of the ash, so that mere ash content is not the determining factor of desirability when considering a coal for pulverization. The importance of this preliminary investigation can scarcely be overstated. Assuming a malleabilizing oven, wherein the temperature does not exceed 1800 deg., it is quite obvious that this is below the melting point of ordinary ash, and aside from the objection to a large volume of ash, any coal can be used.

Considering a furnace of higher temperature requirements, such as a billet heating furnace where say 2300 deg. is desired, it is obvious that a coal fusing at 2500 deg. would be entirely satisfactory, whereas one fusing at less than 2300 deg. may cause clinker formation. In the case of still higher temperature work only those coals which have the highest fusing point could be used, unless ample provision was made for the accumulation of fluid ash.

THE FUTURE

The success of powdered coal lies in its adaptability to the special furnaces of the metallurgical field, and in those cases similar to the locomotive, where there are other and weighty considerations in addition to the actual relative increase in combustion efficiency.

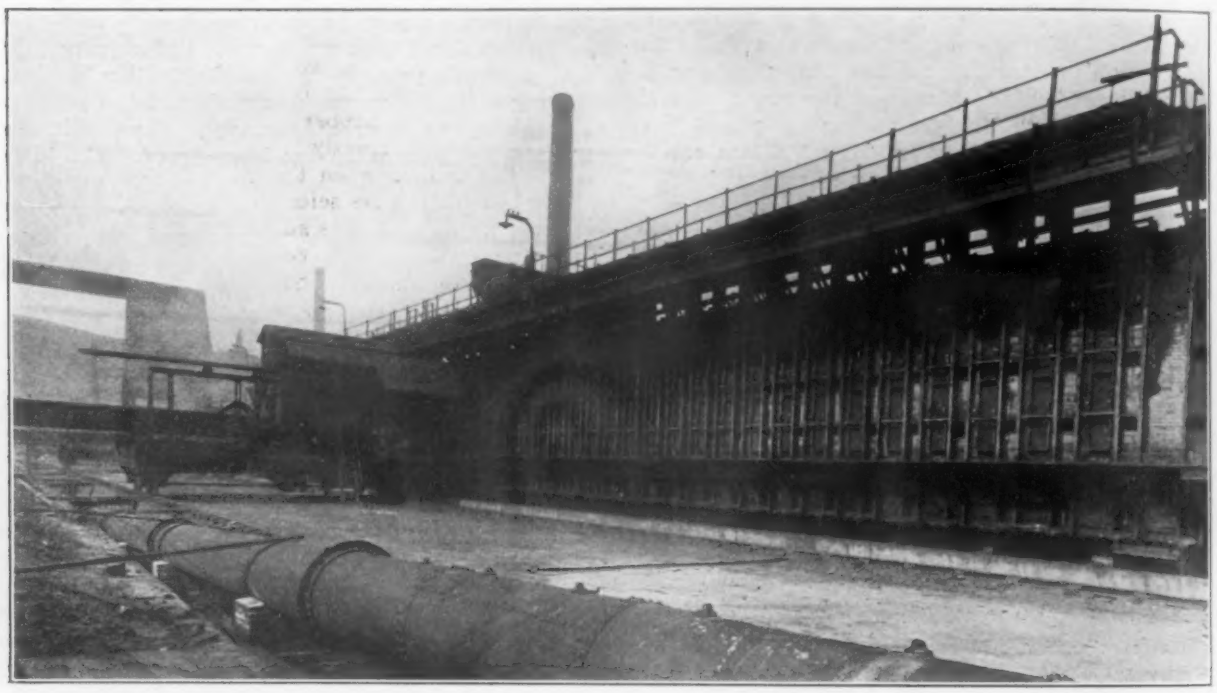
The Gulf States Steel Company reports that its net earnings after interest charge, reserves, etc., were $182,545.50 for April and $583,032.35 for the first four months of the present year. The only bonds on this property amount to $262,000, interest on which is but $16,000 annually. April broke all previous records of ingot production and of shipments of finished products, although the effect of the improvements and betterments now in process of construction, for which funds were recently provided, is not yet reflected in current earnings.

Motor cycle production in the United States in 1914 amounted to 62,793, valued at $12,306,447, against 18,628 in 1909 valued at $3,015,988. This is an increase of 237.1 per cent in number and 308 per cent in value.

An Improved Design in Coke Ovens

The Gas Machinery Company is Building at Terre Haute, Ind., Ovens Having Features of Strength, Gas Flow and Heat Control

THE development of the by-product coke-oven has brought a pretty well-defined standardization of design, the distinctions between the several recognized types lying in the arrangement of flues in vertical or horizontal position and the manner of heating the gas and air or both. With intent to retain the maximum of strength and rigidity in the oven construction and also to increase the uniformity of heat distribution and transference, from which the hot air passes into the horizontal flue *S*. Thence the heated air rises through the ports *F* into the vertical flues *G* and out through the ports *H*, where it meets the fuel gas entering through the gas inlets *J*. Combustion takes place down the vertical flues *K* and up through the parallel flues *L*. The waste gases then pass downward through the ports *M*, the flues *P* and the ports *R* into the horizontal flue *E*, which parallels the hot



Pusher Side of Coke Ovens of Cambria Steel Company

from the burning gases and through the oven walls to the coal charge, at the same time preserving an easy regulation and control, the Gas Machinery Company, Cleveland, Ohio, has further improved its coke oven, the first installation of which was made at Johnstown for the Cambria Steel Company. The oven is especially distinctive in that the gas burns in two adjacent flues in a continuous direction and upon reversal, burns in the opposite direction in contrast with that arrangement of gas flow which provides for the burning of the gas in groups of from 5 to 15 adjacent flues, the products of combustion passing out of the next group of a like number of flues. A continuous flame, also, is maintained in this oven in all of the gas heating flues irrespective of the direction of the flow.

This oven is of the vertical flue cross-regenerative type. The gas burners are located near the top of the oven. The flow of gas, air and products of combustion may be traced from the accompanying cross-section cut of the combustion chamber of the ovens and also from the typical perspective sectional view.

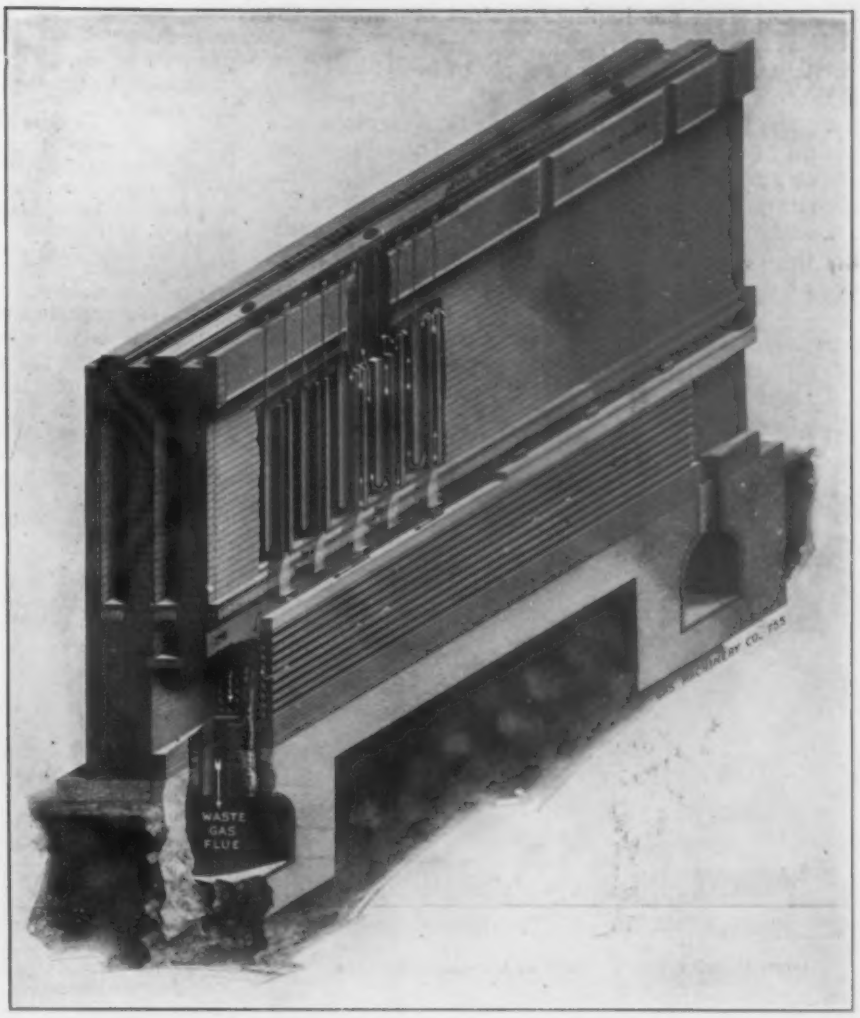
Referring to the drawing, the air for combustion enters through the waste gas flue *A* and passes up through *B* into the regenerator *C*. The air is heated in these regenerators by flowing horizontally through hot checker brick to the vertical flue *D* air flue *S* and so into the regenerator *T*, which takes up the heat of the gases on their way to the stack through the waste gas flue *W*.

Upon reversal the flow is, of course, in exactly the opposite directions, and in this connection it is to be noted that the reversal does not take place from one side of the battery to the other, but simply from one flue to the adjacent flue. In short, the arrangement of flues and the flow of gases suggests a consideration of this oven as a combination of several ovens, each being independent of the other.

The gas is burned in the flues, it is noted, with a long soft flame, which floats from the point where the air and gas meet to a corresponding point on the adjacent flue; that is, all of the gas heating flues carry a flame at all times, even though the direction of flow is reversed, and an unusually even distribution of heat is accordingly the result. The length of travel of flame and hot gases is the same in all of the flues and on account of this fact uniformity of draft on any one flue or set of flues is obtainable and concentration of heat at any one portion of the oven prevented. On account of the uniformity in the heat, less power, it is found, is required for pushing the coke and the strain on the oven walls is less with increase in the life of the oven. For this reason the oven may be operated without regulation

of gas or air in individual flues. Means of regulation are, however, provided for both gas and air, so that the uniform distribution of heat with a minimum gas consumption may be insured.

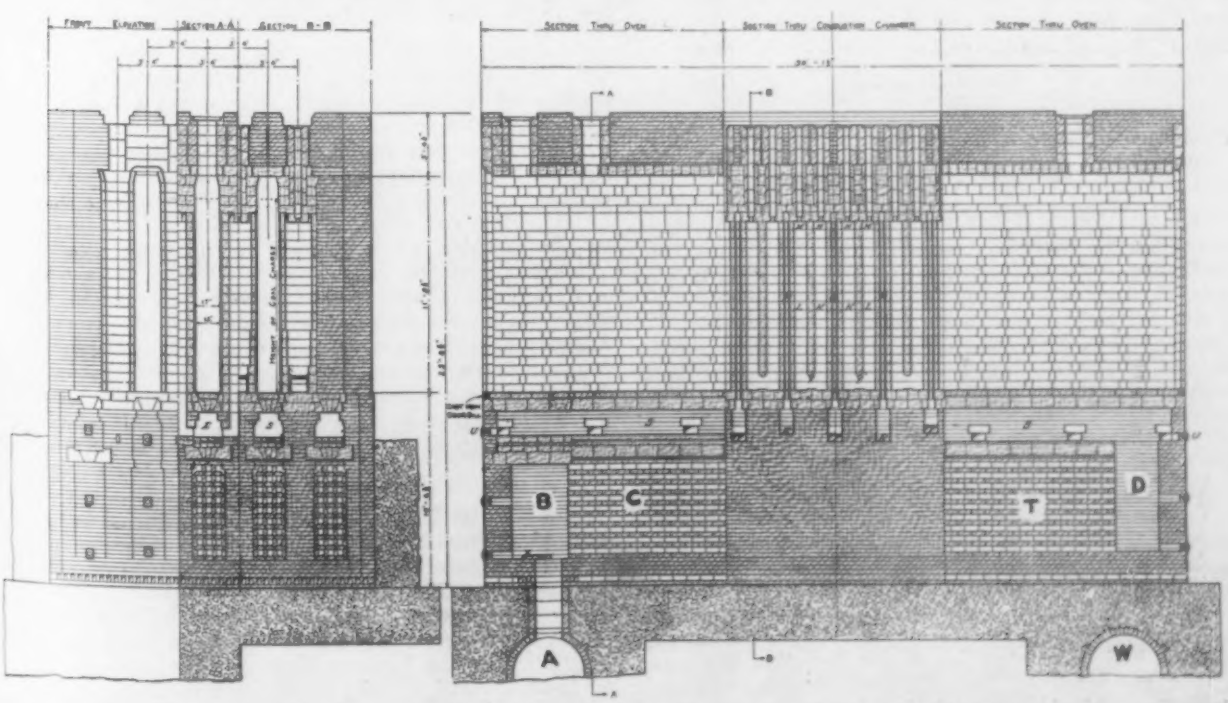
On account of the difference of 2½ in. in the width of the coal charge between the pusher and coke sides of the oven chamber, it becomes advisable to regulate the amount of gas and air in different flues according to the thickness of coal at that point. Each gas inlet port is equipped with a spring bushing, which may be turned with a key, thus opening or closing the port to the desired amount. In the horizontal flues *E* and *S*, under the oven sole, sliding brick are provided with which ports *F* and *R* may be throttled. In addition, a damper *Z* is provided in flue *B* with which the draft on individual ovens may be regulated. In connection with regulation, adequate means for inspection of the combustion are provided, openings covered with cast-iron plugs are located at the top of the battery over the gas flues, and inspection holes are provided at each end of the flues *E* and *S* and just above the damper *Z*.



Isometric Sketch of the Gas Machinery Coke-Oven Design

The fuel gas main is carried near the top and at the end of the battery and connections to the individual gas manifolds are made from this point. These gas manifolds are built in flush with the tops of the ovens and are properly constructed to take care of expansion. The gas inlet port is located in offsets from these manifolds. In the oven walls there are no horizontal flues; all the flues are vertical and the walls may be considered as a beam which is held rigidly at the top and bottom.

Though the direction of flow of the flame is reversed, yet the gas is not off of any heating flue at any time and each heating flue carries a flame at all times. The gas being floated in, it is claimed that



Cross-Section of Gas Machinery Oven Showing the Gas and Air Flues

the flame does not impinge against or damage the brickwork in any way.

Adjustment of the gas supply to individual flues is made at the top of the battery. If the gas supply port should become plugged, it is accessible and within easy reach of the operator. The adjustment of the gas inlet port is so designed that if it became necessary to punch carbon out of the port where the gas and air meet, this may be done without disturbing the regulation of the gas supply. The location of the gas supply ports, it is emphasized, is such

Oven Construction at Base of Combustion Flues

that the tendency to form carbon in them is reduced to a minimum, the temperature at this point being insufficiently high to decompose the gas.

With the regenerators of the Gas Machinery oven located directly under the coal charge and the diffused heat from the regenerator transmitted to the coal during the coking period, the regenerators are so-called "cross regenerators," and may be likened to a hot blast stove lying on its side. The waste gases sweep through from one side of the regenerator to the other and a greater recovery of heat is claimed than in types of regenerators where the gas has a short vertical travel.

Effect of Carbon and Manganese on the Corrosion of Steel

"Of late years it has been repeatedly emphasized that different corroding media exert very different effects upon iron and steel, no one metal resisting all kinds of corrosion equally well." To throw more light on this intricate problem, Sir Robert Hadfield and J. Newton Friend in a paper on "The Influence of Carbon and Manganese upon the Corrosion of Iron and Steel," presented before the Iron and Steel Institute in London, May 4, 1916, stated, in supplementing the above remark, that they considered it essential to test steels in a variety of ways, and gave the details and results of their work. An abstract follows:

To the question whether the presence of manganese in steel increases its liability to corrosion, answer has been given in the affirmative by Berthier, Siemens and Snelus, and more recently by Finkener and others. In 1905 Cushman gave the results of an extensive study of the causes leading to the corrosion of wire fence in America, and drew attention to the fact that the majority of the wires that had withstood corrosion reasonably well exhibited upon analysis a low manganese content, less than 0.2 per cent. On the other hand, the more corroded specimens generally contained some 0.5 per cent of manganese.

Two different types of steel have been employed in this research:

1. Two series of carbon steels containing varying quantities of carbon but the other alloying elements remaining very constant, save that in the first series the manganese content was less than 0.2 per cent, while in the second series it averaged 0.7 per cent.

2. The remaining steels contained 2 per cent and upward of manganese.

All the experiments in any one series were carried out at precisely the same time. It is important to emphasize this, for the rate of corrosion is greatly influenced both by the temperature and by the amount of oxygen dissolved in the corroding media; in other words, by the height of the barometer.

SUMMARY OF RESULTS

The results obtained may be briefly summarized as follows:

1. The addition of carbon from 0.03 to 1.63 per cent to pure iron containing less than 0.2 per cent of manganese, results in: (*a*) A steadily increasing rate of corrosion both in tap water and in sea water, slight maxima being observed in the neighborhood of 0.6 to 0.8 per cent carbon. (*b*) An initial fall in corrosion, with a rapid rise to a maximum with 1.05 per cent carbon in the wet and dry tests. (*c*) A rapid rise in corrosion to a maximum with 0.8 per cent carbon when exposed to the action of dilute sulphuric acid. Clearly there is some difference of behavior toward all the corroding media in the case of the steels in the neighborhood of the eutectic composition, the specimens showing either a tendency toward increased corrosion or else a most decided increase in corrosion.

2. The addition of 0.7 per cent of manganese to the above steels results in: (*a*) A very slightly increased corrosion in tap-water, sea-water, and in wet and dry tests with a carbon content up to about 0.4 to 0.5 per cent. From this point upward the manganese, generally speaking, affords a slight protection, which is very decided in the wet and dry tests, but is not invariable in the sea-water tests. (*b*) An enormously increased corrosion in dilute sulphuric acid. This is particularly important, since in commercial steels the manganese content frequently ranges from 0.2 to 0.7 per cent, and it is evident that the latter are absolutely unsuited for exposure to acidified corroding media. Just as in the experiments with the steels of 0.2 per cent manganese content, a point of maximum corrosion is observed; but this always occurs with a smaller carbon content in the steels with 0.7 per cent manganese.

3. By increasing the manganese content to 2 per cent upward: (*a*) The corrodibility in neutral solutions is greatly decreased, particularly when the carbon content exceeds 0.5 per cent. (*b*) The corrodibility in dilute sulphuric acid is greatly enhanced.

In conclusion, the authors emphasize the fact that they have confined themselves to actual results obtained with the steels without in any way considering the theoretical reasons for the observed phenomena. At the same time they consider that theoretical explanations cannot be as simple as might appear at first sight, for the manganese, at any rate in the manganese steels proper, exists not merely as solid solution, but also in part as carbide. Further, some of the steels received a different heat treatment from the others, those with high manganese content having been quenched in the manner usual for such steels when used for commercial purposes. Thus not only are the chemical compositions different in the two sets of steels, but their physical states are not identical. Any theory advanced by way of explanation of the authors' results, therefore, must take all of these points into consideration.

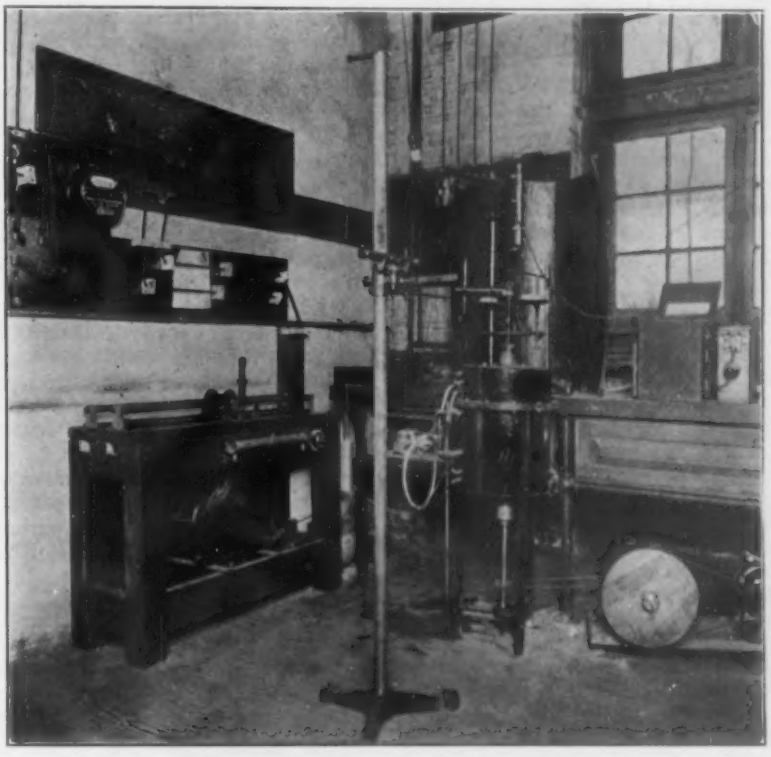
The Wagner Electric Mfg. Company, St. Louis, has acquired manufacturing control of the Carter Carburetor Company, also of St. Louis, a $150,000 corporation, and operation of the latter is now under the direction of the Wagner Company. While the transaction had no direct connection with the munitions orders now being filled by the Wagner Company, the manufacturing needs created thereby make the acquisition an important one in the economy of the Wagner plant.

VISCOSITY OF FURNACE SLAGS

Its Determination the Object of a Bureau of Mines Investigation

The viscocity of blast furnace slags is an important investigation which the U. S. Bureau of Mines is carrying on at its laboratory at Pittsburgh, Pa., under the direction of F. H. Willcox, metallurgist, and A. L. Field, junior physical chemist. The researches will be made public as they develop and are applicable to furnace practice.

The relation of the viscocity or fluidity of blast furnace slags to their behavior in the furnace is an important one. Insufficient fluidity is a source of difficulty. If the slag is regarded as a desulphurizing agent, the degree depends on slag fusibility, fluidity and viscocity. Additions of lime increase refractoriness rapidly. A slag containing 36 per cent silica, 12 per cent alumina and 46 per cent bases, softens at 2428 deg. Fahr., while one with 31 per cent silica, 15 per cent alumina and 15 per cent bases softens at 2629 deg. Fahr., with the higher temperature required for the latter affecting desulphurization favorably by accelerating the reaction velocity. Increased lime content would favor desulphurization and increase the fluidity of the slag up to a certain point, while excessive viscosity, caused by alumina, should have a similar effect.



Apparatus for Determining the Viscosity of Slags. The tall support in the foreground carries the telescope and scale for measuring the mirror deflection. On the left is the transformer and adjustable panel. In the center is the furnace, with the viscosity apparatus partly withdrawn so as to be more easily seen. Above it is mounted the optical pyrometer. The electric motor and countershaft are shown on the lower right-hand side.

Desulphurization depends on chemical reaction and diffusion. The nature of the slag should be such that the calcium sulphide formed has an opportunity to diffuse in the slag. If this is viscous or sluggish, so that the sulphide cannot readily diffuse, sulphide concentration may occur along the zone of contact between the iron and the slag, stopping the reaction and eliminating sulphur so that the iron is off-grade. This may result from low temperature of the slag, from an excessive proportion of bases, or of alumina in certain circumstances.

The viscosity of slags not having been measured before this, a suitable method and furnace were necessary. The furnace developed for this purpose is of the resistance type and has a granular carbon lining, inclosed in an air-tight sheet-iron shell, with a heating zone 3 in. in diameter and 7 in. long. The furnace is operated from a transformer equipped with an adjustable panel, giving voltages ranging from 40 to 100 in steps of 2 volts, and requiring a maximum input of 5 kva. and a maximum current of 110 amperes. The furnace is so constructed that the granular carbon can be replenished at the end of each run if necessary. The furnace atmosphere consists of nitrogen and carbon monoxide.

The torsion method of measurement is used and is one that has not hitherto been employed except at ordinary temperatures. The crucible is mounted centrally within the heating zone on a vertical support that can be rotated by means of an electric motor and countershaft. The crucible is filled with slag and the current switched on. When the slag has melted, the crucible is rotated at a constant speed approximating one revolution per second, and a small spindle, which is supported at its upper end by a calibrated steel ribbon, is dipped into the slag. The torsion system is sufficiently weighted and damped so as to prevent disturbing vibrations and irregularities and has exerted upon it a continuous torque by the rotating liquid slag. This torque is accurately measured by means of a mirror and scale. Simultaneous measurements of viscosity and temperature are made, the latter by means of an optical pyrometer of the Holborn-Kurlbaum type. As temperature measurements by optical means in the neighborhood of 1500 deg. C. are usually liable to an error of 5 deg. between duplicate reading and often 10 deg., the measurement of torque is as precise as that of temperature. For a temperature difference of 10 deg. C. the torque, and hence the viscosity, changes 8 to 50 per cent, depending on the temperature and the composition of the slag.

The practical usefulness of the determination of viscosity has been demonstrated by the temperature viscosity curves already obtained, which show many interesting facts regarding the function of the slag in blast-furnace practice. These curves cannot be determined by any single isolated measurement, such as the melting pot, softening point or free-running temperature. The physical melting point may correspond to a temperature at which the silicate mixture has all the external appearance of a solid, and in the case of complex blast-furnace slags has no obvious connection with free-running temperature or viscosity, which is a physical property very difficult to estimate even approximately by the eye.

The results of this investigation may possibly show that a slag under conditions of blast-furnace operations may vary 50 per cent in viscosity without affecting pronouncedly its free-running characteristics as estimated by the eye. This would correspond to a fluctuation of slag temperature of about 50 deg. C., which has been observed repeatedly, under normal operating conditions, in measure-

ments of slag temperatures at flush made in the present investigations.

A relative and absolute fluidity test, it is hoped, will be developed, and from the results of the experiments with numerous types of slags it should be possible to construct a set of comparative tables from which one can determine:

How a given slag will act in the furnace.

The combination of bases and acids possessing the most desirable fluidity and fusibility compatible with silicon content desired and the silicon and sulphur content of the burden over a range of furnace temperature.

The heat increment necessary to confer the required fluidity in refractory slags for the diffusion of sulphides and the elimination of sulphur, and applicable to the special problems encountered in using titaniferous and aluminous burdens.

VOCATIONAL TRAINING SURVEY

Report of Investigation of Education System for Metal Trades in Cleveland

Recommendations for radical changes in the present vocational training system are contained in the report on education for the metal trades of Cleveland, Ohio, just issued by the Survey Committee of the Cleveland Foundation, of which Charles E. Adams, president Cleveland Hardware Company, is chairman and Allen T. Burns is director. The reading of the survey leads to the conclusion that the public schools, of Cleveland at least, have fallen far short in solving the problem of reaching the great mass of boys who go into the metal trades.

WHY APPRENTICE SYSTEM IS ABANDONED

The survey found that only one-fourth of the machine-tool operators in Cleveland are skilled mechanics. This is due to the heavy demand for machine-tool operators, who learn their trade in a few months, as compared with three years for apprenticeship before becoming mechanics, but more particularly to the fact that machine tending is much more attractive to a boy from the wage standpoint than is apprenticeship. The report declares that the high rate of pay for specialized machine work is, in fact, the greatest obstacle to the extension of the apprenticeship system. According to the figures presented, a boy during his first three years will earn, as a machine operator, $1,800; if an apprentice, only $1,200. It will take nine years for an apprentice who becomes a machinist to bring his total earnings to those of the machine operator. A few manufacturers were found who are endeavoring to restore the apprenticeship system to the position it once held, but most employers have abandoned it, claiming it does not pay. The objection most commonly offered to the apprenticeship system is that boys leave before the end of their term and their employers object to training machinists for others.

The proportion of men capable of becoming foremen was found to be growing smaller every year. This was attributed in part to the rapid growth of the industry and in part to the failure to provide an adequate training system. A modern specialized factory organization affords few opportunities for developing all-round workmen capable of filling foremen's jobs. In large plants the foremen are chosen more for their ability to handle men than for their technical knowledge.

TECHNICAL HIGH SCHOOLS NOT HELPING

The problem of vocational training for the skilled occupations in metal trades is divided in four groups: first, boys still in school who wish to learn a trade; second, boys serving as apprentices; third, helpers or machine operators, and, fourth, journeymen machinists, each group constituting a separate educational problem. The majority of the boys leave school at the end of the compulsory attendance period, 15 years; less than half go beyond the seventh grade, and it was found that less than 8 per cent of those working as machinists, apprentices and machine operators had received any high-school training.

Many boys either do not reach the grades in which a beginning in vocational training might be made or they stay in them so short a time that little or nothing can be accomplished. Consequently the technical high schools do not help these boys.

The technical high schools of Cleveland were found to be primary training schools for civil, mechanical and electrical engineering. Only 28 per cent of the graduates of one school, from which data were secured, are working at skilled trades. The survey holds that little can be expected in trade training from a technical high school, and that vocational training to reach any large number of boys must begin not later than the fourteenth year.

RAISING COMPULSORY SCHOOL AGE TO 16 YEARS

As a solution of the problem, the survey recommends the junior high school plan for vocational training, two of which have been established in Cleveland. These schools provide a general industrial course, covering shop mathematics, mechanical drawing and the principles of industrial physics. A machine shop is recommended for this school, but shop training for other trades is not regarded as practical owing to the small classes. A two-year vocational course in a special school is also recommended, with an attendance secured by raising the compulsory school age to 16, so that the age of leaving school will coincide with the minimum age for entering the trades. This will provide an opportunity for boys between 14 and 16 to obtain a practical training in the trades before they leave school.

The attendance at the evening technical schools is limited, and the boys who take advantage of this course attend only a short time. Night-school classes do not hold the boys long enough to make more than a beginning in trade-extension learning, and the report expresses doubt that growing boys ought to be expected to add two hours of study to their labor in the shop. Factory apprenticeship schools are regarded as satisfactory, but practical only in very large plants.

The survey finds that good results have not been obtained through the voluntary co-operation of employers with private or public schools. In the opinion of the survey the only practical solution of this problem lies in the day continuation school backed by a compulsory law that will bring every boy and girl at work under the age of 18 into the day continuation schools for a certain number of hours per week.

The Manufacture of Rubber Belting

The processes employed in connection with the manufacture of rubber belting in England were described in a paper read by James Tinto before the Manchester Association of Engineers at its meeting on March 11. As the cotton duck comes from the weaver it is thoroughly dried by passing through a cylindrical drying machine, after which it is coiled up and taken to a rubber friction calender. Here the friction surface of rubber is fed on the duck, the two passing through the heavy calender rollers. The material is then cut into various widths according to the sizes and ply of the belts required, after which it goes to the making-up tables. The belt is next rolled to drive out the air between the plies and prevent blistering during the vulcanizing process. The outer rubber covering is next applied to the desired thickness and the rolling process is repeated.

The next stage is to take the belt to a large hydraulic press, where it is placed between two steam-heated chests and vulcanized at a temperature of not less than 280 deg. Fahr. The presses are designed to exert a pressure of 200 lb. per square inch and have thirty 12-in. rams arranged in pairs operating at a pressure of 1500 lb. The rams are located underneath the bottom steam chest, which is movable so that the whole mechanism can be lowered by gravity. The floor space occupied by the presses is 6 ft. in width and 30 ft. in length. With the vulcanizing process the belt is complete except for finishing and coiling. A thin overflow of the rubber covering is left by the vulcanizing and this has to be trimmed off and the edges of the belt ground with fine emery before it goes to the coiling machine.

The Steel Industry of Belgium

In Spite of Economic Isolation and Lack of Natural Resources an Export Trade Was Built Up and Is Yet to Be Reckoned With

BY H. H. CAMPBELL

For the last two thousand years Belgium has been one of the most important iron-producing regions in Europe, and between 1860 and 1885 the blast furnaces of one province alone used 1,000,000 tons of slag that had been discarded as waste from thousands of old charcoal hearths, once operated in the district that bears the highly descriptive but rather cumbersome appellation, "Between Sambre and Meuse."

The industry has always centered in the southern part of the country around Charleroi and Liége, a district inhabited by the Walloons. They are a Teutonic race, who are superior in endurance and in craftsmanship to their Celtic neighbors in the northern provinces and in France, and they have always been noted for their skill in making firearms, the shot guns made in Liége to-day being prized by sportsmen. It was here that blast furnaces were first operated more than 500 years ago; while the indirect method of refining pig iron bears the name of the "Walloon process" from the place of its birth.

COAL

It is in this Walloon district that we find the coal mines on which the steel industry and all the other activities of the country are founded. Mining is dangerous and expensive on account of the depth of the shaft, the dislocation of the strata and the frequency of explosions; but conditions are no worse than they are in the French mines near by, while the Belgian coal gives a better and cheaper coke than can be made in France, and for this reason large amounts of fuel are exported to the French blast furnaces in Meurthe et Moselle.

It would seem that the supply of coal is scant, for while other countries are increasing the output of their coal mines, the production in Belgium is stationary or even decreasing. Taking the decade just before the war, we find that in 1903 the production of coal in Belgium was 23,871,000 metric tons, while in 1913 it was only 22,858,000 tons. This decrease was not due to abnormal conditions in those two years, because the output has been practically stationary for the last 20 years.

During this period from 1903 to 1913 the production of coal in the United States increased 60 per cent; in Great Britain, 23 per cent; in Germany, 18 per cent; in France, 15 per cent; while in Belgium it decreased 4 per cent. Yet all this time the output of pig iron from Belgian blast furnaces was increasing, and every year coal was being brought from Germany. For a long time this condition of affairs caused grave apprehension, but in 1913 it was announced that new beds of excellent coal had been discovered and the future looked bright. It is needless to say, however, that no development work has been pushed during the last two years.

IRON ORE

For 50 years ore has been brought from Spain to make iron for the acid Bessemer, and such pig iron to-day constitutes about one-sixth of the total output of pig iron in Belgium; but these importations are not increasing and they call for no special comment. The main source of supply is the minette district just over the southern frontier. Until recently the ore came mainly from Luxemburg and from the vicinity of Longwy, but lately large amounts have been brought from Briey, a little farther south.

A few years ago figures were collected from many Belgian blast furnaces showing the average composition of shipments aggregating over 1,000,000 tons of this Briey ore. The results are given herewith, the first line showing the composition of the ore when dried at 212 deg. Fahr., while the second line is found by calculation and tells what the results would be if the ore were calcined, or, in other words, what we would have a few feet down in the blast furnace.

Composition of Briey Ore

	Iron	Silica	Lime	Loss on Ignition	Phosphorus in Pig Iron
Dried at 212 deg. F.	38.2	6.6	11.3	19.0	1.68
Calcined	45.7	7.9	13.5	0.0	1.68

PRODUCTION OF STEEL

The acid Bessemer process was introduced into Belgium in 1863, while the basic converter was started in 1879, or only one year after it first appeared in England; so that it must be acknowledged that Belgians have not lacked initiative. Developments have been confined almost wholly to the neighborhood of Charleroi and Liége, and the whole steel industry is founded on the coal deposits of the Walloon district, on the inherited aptitude of these people for the working of iron, and on the low wages that are paid.

The metallurgical situation is just the same as in Germany and France, the basic Bessemer being used preferentially; but, of course, the open-hearth furnace has its place in disposing of scrap. No statistics are published that distinguish between acid and basic steel from either the converter or the melting furnace. In 1903 Belgium made 981,370 tons of steel, while in 1913 it made 2,466,630 tons, an increase in the decade of 151 per cent, but during the same period France increased almost as much, or 149 per cent; while the United States and Germany each gained 115 per cent, and Great Britain only 49 per cent.

This advance in the Belgian output is due to the strong strategic position of the Belgian steel works, which are very favorably situated for handling the ore from the mines that have recently been opened at Briey in France. They also have great advantages for supplying the export trade, for both Charleroi and Liége are within 70 miles of Antwerp, which in point of tonnage is the second seaport of the world, ranking next to New York.

ABSENCE OF SPECIALIZATION

In the United States there is such a wide market that mills can be built to make one kind of product only and may be equipped with expensive special labor-saving apparatus. This is good policy when there is work enough to keep the mill busy; but in Belgium the market is limited. For instance, it would hardly pay to build a universal mill for rolling narrow plates when the total output of all kinds of plates is only 45,000 tons per year,

or less than 4000 tons per month. One of our big rail mills would be idle most of the time, for the total rail production in Belgium is only 30,000 tons per month, and this includes all rails, heavy and light, for steam roads, tramways and mines, for use at home and for export.

Under these conditions every mill must be a "jobbing mill," and a large plant has very little advantage over a small one; so we are not surprised to find that there are 12 steel works in Belgium with 40 converters in use, although only 2,466,630 tons of steel was made in 1913. Nearly all concerns engaged in the making of iron and steel belong to a society organized to discuss trade problems, and the representatives meet every week without any interference on the part of the government. There are 350 companies in all in this organization, including 26 steel foundries, 20 axle works and 16 locomotive works.

THE EXPORT TRADE

These conditions do not make for economical production, but, paradoxical though it may seem, they do make for foreign trade, since the rolling of unusual shapes does not entail changes in special machinery, so that the needs or whims of customers may be satisfied. The method of rolling everything by "hooks and tongs" would be expensive in this country, but wages in Belgium are only half what they are here.

The export trade is not a mere incident, as it is with us. In 1913 a paper was read at the Brussels meeting of the Iron and Steel Institute (British), in which it was stated that the value of the manufactured goods exported from the United States was 7 per cent of the total value of all the goods made. France exported about 12 per cent; Germany, 32 per cent; Great Britain, 44 per cent; but Belgium sent away 80 per cent by value of all her manufactures.

BELGIUM A MANUFACTURING DISTRICT

The large percentage of goods exported makes Belgium a much more important factor in international trade than would be indicated by a mere statement of her productive capacity; and we ought to inquire why that little country plays such a large part in the commerce of the world. The inquiry will take us away from metallurgy into the field of social and political economy; for the answer is that all Belgium must be regarded as a unit and as forming a manufacturing district.

Belgium is merely a point on the map, for the total area is only 11,873 square miles, which is equivalent to a square 109 miles on a side. At the last census it had a population of 7,433,000, or just about the same as New York City with its immediate environs. We know that the manufactures of Greater New York exceed in value those of any State in the Union except Pennsylvania, and come pretty close to that; but 40 per cent of the value is represented by ready-made clothing, and this is not intended for the people of the city, but is sent all over this country. In other words, it is "exported" and distributed over a territory as big as Europe.

It is not quite fair, however, to compare Belgium with New York, because Manhattan Island is primarily a commercial rather than an industrial center. From the figures just given we find that there are in Belgium 650 persons per square mile, or one person to the acre. There is no similar area in this country, for Rhode Island, which is our most thickly settled State, has only one-tenth the area of Belgium, with a population of only 435 per square mile; Massachusetts comes next with 407, New York has 185, Pennsylvania 170, Ohio 116, while Illinois has only 100.

On the other hand, it is not difficult to find places in Europe where there is a similar concentration of population. Just across the eastern frontier of Belgium is the Rhine Province of Germany, which is almost exactly the counterpart of Belgium in area and population; but we hear little about it because it does not have a separate political existence. A more striking case is found in western England. It is easy to draw a square a hundred miles on a side which will take in parts of Lancashire and the West Riding of Yorkshire and include Liverpool, Manchester, Leeds, Halifax, Bradford, Derby, Nottingham and Sheffield, and will have twice the population of Belgium in an equal area.

ECONOMIC ISOLATION

There is a vast difference, however, between the general economic status of Belgium and the conditions surrounding Lancashire and the Rhine Province; for these last are parts of great nations and have a broad market at home. But Belgium stands alone. It is not possible for all her products to be consumed at home, while political and economic barriers are on every side.

Immediately adjoining her territory on the east are the Rhine Province and Westphalia, which are the very heart of industrial Germany; on the south are the steel works of the Minette district of France, and the Belgian blast furnaces must bring all their iron ore from this very spot; on the west are the busy industrial provinces of northern France protected by a high tariff; while across the Channel is England, which is not trying to buy, but to sell manufactured goods.

LACK OF NATURAL RESOURCES

In any general survey of the situation it must be kept in mind that Belgium is almost without natural resources. Ore must be imported to make iron and steel; copper, lead, tin and platinum must be brought from abroad for use in the arts; gold and silver to make money; leather for shoes; and wool and cotton for clothing. About the only raw materials that can be produced in Belgium in excess of domestic needs are flax, zinc and coal.

Moreover, the country will not supply sufficient food for the inhabitants, although a great part of the land is under intensive cultivation. Wheat fields are forced to yield an average of 37 bushels per acre, which is more than is raised in any other country and which contrasts with 14 bushels in the United States; yet Belgium can only raise half the cereals needed by the people.

This is not surprising, because France has a population of only 190 per square mile, and is able to raise just enough wheat to supply her wants. Germany has 310 per square mile and must import grain. Great Britain has 375 per square mile, but if we omit Scotland and Ireland and consider only England and Wales, we have a population of 620 per square mile, which is approximately the same as Belgium; and we know that England raises only a fraction of the wheat it consumes. Over one-third of the land in Belgium cannot be cultivated, for large areas are subjected to inundation by the North Sea, while the southeastern part is made up of rugged hills which are covered by forests, as they have been for thousands of years.

BALANCE OF TRADE

Until within a year or so the man in the street did not talk about the balance of trade because the current theories on the subject, as preached by professors of political economy, did not gibe with

common sense. According to these teachers the prosperity of a country is measured by the simple process of adding together exports and imports. If we ship cotton to France, it is the proper thing to take silks and champagne in return, because this will increase "the volume of trade." It is not a good thing to ask that American railroad bonds owned by Frenchmen be sent over in payment, for this will not appear in the statistics.

But men have been brought to their senses by this war, and the statesmen of Europe have now discarded this old nonsense and are talking about the balance of trade in language that the average every-day man can understand. Speaking, then, in the vernacular the industrial and commercial unit that we know as Belgium has been "running behind," which is not surprising when we consider that almost everything, including food and clothing, must be imported.

In 1912 the value of the merchandise imported into Belgium exceeded the value of the exports by $194,000,000, or $26 per capita. Great Britain in the same year had an adverse visible balance of $23 per capita, but this was overcome by the return on her foreign investments. France had an unfavorable balance of $7.40 per capita, which likewise was counterbalanced by dividends from abroad; while Germany had an adverse balance of $6.40 per capita. In the same year the United States had a favorable visible trade balance of $4.80 per capita, which was canceled by the interest paid to Europe for money we had borrowed and which we had spent in various wasteful extravagances.

Belgium has an invisible credit item arising from the expenditures of tourists, but this will only cover a fraction of the total. The people of Belgium have some foreign investments that bring money to the country, as, for instance, holdings of stock in Russian iron works; but much of the so-called Belgian capital invested abroad is really French money, representing companies that have been formed in Belgium to take advantage of the liberal laws governing incorporation.

THE FUTURE

We do not have to prove that it will take some time for Belgium to recover. The steel plants of Germany are turning out 80 per cent of their normal output, and that means that a turn of the hand will bring a full product; while the mills in Great Britain have hardly been affected at all; but in Belgium, as well as in eastern France, while the steel plants have not been injured physically, the whole industrial, commercial and financial structure has been overthrown.

Coal mines must be put in operation; ore imported from France; organizations built up in the steel works and new skilled workers trained; orders sought from the ends of the earth, and there will be no money and no credit; while Great Britain, Germany and the United States will fight for every order. It is not a pleasant prospect, but these people must live. In the United States we go after foreign trade because we want an extra piece of cake, but Belgium must export the products of her factories in order that her people may buy bread. That is the kind of competition that we must face in the future.

For attachment to any wagon like a horse the Parrott Tractor Company, Jackson, Mich., is building a gasoline motor tractor. The tractor has a four-cycle, four-cylinder engine, works at three forward speeds and has electric starting and lighting equipment. The weight of the tractor capable of drawing 3 tons is 1500 lb.

VOCATIONAL EDUCATION

Overwhelming Vote of Business Organizations Approving Federal Assistance

That the business interests of the country are in favor of federal aid for vocational education is indicated by a preliminary count of the votes cast in a referendum taken by the Chamber of Commerce of the United States. Three hundred and fifty-three commercial organizations in 42 States, also in Alaska, Hawaii and the District of Columbia, participated in the ballot. Elliot H. Goodwin, the general secretary, states that all four recommendations put forth by a special committee of which Frederick A. Geier, Cincinnati, is chairman, were carried by the two-thirds majority necessary to commit the National Chamber.

On the first recommendation of the committee, that there should be federal appropriatons for promotion of vocational education in the United States, the vote was 831 in favor and 110 opposed, each organization being entitled to from one to ten votes, according to its membership.

The committee's second recommendation, that federal appropriations should be allotted among the States upon a uniform basis and should bear a uniform relation to appropriations made by the States for like purposes, was carried by a vote of 828 in favor as against 95 opposed.

In order that the Government may have administrative means of giving effect to any federal laws which may make appropriations for vocational education, and may have an instrumentality for consideration of the peculiar interest of the nation in vocational education in all its forms and applications, a suitable federal agency was advocated. For this purpose the committee's third recommendation urged the creation of a federal board to administer the national functions in vocational education which are proposed, this board to be representative in its personnel of the interests which are vitally concerned, and to be given compensation sufficient to command in its membership the ability appropriate for the task which is to be performed. The result of the balloting was 788 votes in favor and 144 opposed.

There were 784 votes in favor and 137 opposed to the committee's fourth recommendtion. It was that the federal board, however constituted, should be required to appoint advisory committees of five members each, representing industry, commerce, labor, agriculture, home-making, and general or vocational education. It was stipulated that these advisory committees be appointed for only such periods of service as the federal board may determine; that the members receive reimbursement for their traveling expenses and compensation for the time they actually spend in the active discharge of their duties; and that the personnel of the committees represent as many different parts of the country as the geographical distribution of the industry in question will permit.

The opinion of the special committee, as brought out in its report, was that without Government cooperation and the impetus which will come from federal appropriations, the States can themselves develop vocational education only very slowly. The industrial welfare of the country, however, demands all haste that is consistent with care. The Federal Commission on National Aid to Vocational Education, appointed by the President in 1914, reported that only eight States had established systems of vocational education, and these systems have not yet reached 1 per cent of the workers who need industrial training. The committee made no suggestion that the Government should do more than extend to the States its financial assistance and the encouragement which will flow from its appropriations and its example.

The Gerlinger Steel Casting Company, West Allis, Wis., is installing a 1½-ton Snyder electric furnace to replace a ½-ton unit which has been outgrown. The company can hardly take care of its orders, in which automobile, motor truck and mining machinery castings predominate.

Developing the Human Side in Industry

The Industrial Service Movement of the Young Men's Christian Association and the Widening Interest of Engineering Colleges

BY FRED H. RINDGE, JR.*

The right kind of industrial betterment has come to stay. In many industries it has been a long accepted fact. It is no more sensible to bring accusation against it because it pays than it would be to lay the same charge to efficiency because it pays. At the same time I would hate to be connected with any firm where there was nothing but efficiency. Nor would I care to be working where there was only industrial betterment. Any industry needs more than safety, compensation, sanitation, education, recreation, proper housing of employees, profit sharing and all the other things usually included in the term. It needs the human touch.

Many methods have been tried with varying success. I have no desire to exploit any particular type of work at the expense of other types thoroughly worthy. Neither do I make any apology for quoting a man like Judge Elbert H. Gary, who has said: "I am glad to declare my belief in the advantages of having a Young Men's Christian Association in an industrial community as tending greatly to the building up of the character of the men, and therefore increasing their efficiency."

Cleveland H. Dodge recently said:

> As an officer of the Copper Queen Mining Company and the El Paso & Southwestern Railroad, both of which companies are largely interested in the growing cities of Douglas and Bisbee, Ariz., I want to express my unqualified appreciation of the work that has been done there under the auspices of the association. In both of these cities there is a large floating population of young men who have been greatly benefited by the work of the association, but the great benefit has accrued to the large number of young men in the employ of the companies in the offices, mines, smelting works and railroad, who have found a social center in the association buildings.

Industry and the Young Men's Christian Association have a common basis in character building. Industry as never before needs and the association produces men of character and training. There is a very definite reason why some of these great leaders of industry look to this organization to do much of their betterment work. Says E. J. Buffington, president Illinois Steel Company:

> It seems to me that the claim of the association for the support of industrial interests in a community should be readily recognized and responded to liberally. The record of achievement in the direction of high grade work done by the Association alone should win this support. The benefits received by industrial interests in communities where the Association organization is well and actively established are easily recognizable. These benefits are highly practicable. The association stands for the highest ideals for young men, including the idea of honesty and efficiency in all good work.

ASSOCIATION HAS 100,000 INDUSTRIAL WORKERS

In passing it is interesting to observe that this association has 100,000 industrial workers in its membership on this continent. The "wop," "hunkey," "polak," the skilled American workingman, the negro, the boy apprentice, are served in the great cities, in mining and lumber towns, in mill villages, in construction and reclamation camps—in short, wherever the need exists—regardless of the men's nationality, color or creed. The thing works because it is democratic; it is supported by both employer and employee (mutuality), it has trained secretaries in charge, and has efficient state and international supervision. This means that each local association is kept in touch with the latest methods and developments in very other association.

This organization, unlike any company, is ready to give its whole time to the human side of its job. Its work is not one-sided, but cultivates every phase of a man's life—educational, social, physical and religious. Expressed in activities this means educational classes, special instruction to foreigners, lectures, clubs, observation trips, hygiene and first-aid, social organizations, shop receptions, entertainments, healthy recreation, home-sanitation, bible classes, straight character building, and a hundred other things, adapted thoroughly to local conditions.

All such work is carried on not only in the regular buildings, but through extension service wherever men can be found. Emphasis is placed on training and the men themselves are given responsibility through committee service and leadership. And what does this mean to an industry from the practical standpoint? John J. Eagan, president American Cast Iron Pipe Company, says:

> For several years we had been considering welfare work at our Birmingham plant. I spent time visiting plants and reading along this line. We did not want an outside agency, believing that we could do the work better ourselves. We delayed starting lest we should make a mistake.
>
> Finally we reached the conclusion that the Y. M. C. A. was far better equipped to do this work than any individual manufacturer, no matter how great the interest in his employees.
>
> We are greatly pleased that we turned our welfare work over to this organization in its very inception. They have saved us from many mistakes. Our work was a success from the day it opened.
>
> The Y. M. C. A. placed at the head of it a man with training in just this kind of work, with the understanding that if not entirely satisfactory they had other men from whom they could draw.

In this case the association has on its staff a corps of doctors and nurses as well as regular secretaries. Accidents have decreased 50 per cent and tonnage increased 13 per cent. The Du Pont Powder Company at City Point, Va., has increased the number of employees from 300 to over 18,000, and there the association representatives work in three shifts to fit in with the industry. Adaptability and service are the keynotes.

The Newport News Shipbuilding Company has had an exceedingly interesting experience in the increasing of efficiency. President Ferguson testifies that since this welfare agency has been on the job his colored workers have stuck to their work with so much more regularity that they have been able to drive 5000 more rivets a day—enough in one year to rivet three battleships. Innumerable other illustrations could be given, but space forbids.

FUTURE INDUSTRIAL LEADERS MEN OF SYMPATHY

Regardless of all these things it is perfectly clear that our future leaders and men of influence in the industrial world must be men of sympathy, tact and vision, and men with a real appreciation

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of the human side of their work. Much of the future leadership in industry will come from our engineering schools and colleges.

For seven years I have been making an extensive and careful study of the problem and am convinced that the colleges are alert as never before. Many professors are accustomed to talk to their students along the lines indicated. To be sure, some colleges have a long way to come yet. On the other hand, many engineering curricula are including definite instruction in management, the improving of industrial conditions, industrial betterment and the human side.

Professors and business men have requested an outline for a practical course on these lines to be required for seniors. After careful consultation with deans of engineering, professors, business men, social workers and others, the following has been evolved:

INDUSTRIAL RELATIONS COURSE FOR ENGINEERING SCHOOL

1. Introductory—The Human Factor in Industry.
Two periods—Showing in an interesting way that men comprise the most important element in any industrial operation. The dignity of labor.

2. Historical—The Evolution of the Individual Worker in Industry.
From two to four periods. A brief summary of the history of industry with special reference to the influence of changing conditions upon the human factor. Industrial evolution.

3. Industrial Organization—The Influence of the Modern Factory System on the Worker.
Three to five periods. General and departmental organization. Management. The relation of wages, hours, etc. The interdependence of men. Should foremen, superintendents, managers, etc., be chosen on the ground of their ability to deal sympathetically and successfully with men? Which forces are beneficial and which detrimental?

4. Human Factors in Production.
From six to sixteen periods. Problems to be solved:
a. General—Capital and labor, immigration, unionism, socialism, syndicalism, anarchy and the I. W. W., etc. What shall be our attitude toward these questions?
b. Working Conditions. What are the determining factors in the efficiency of the individual man? Do right conditions pay?
c. Living Conditions. What relation has health to efficiency? Can a "home-garden" have any effect on a man's work in the shop? Study of the budget of typical working families.
d. Leisure Conditions. Why is "big business" interested in these things: Amusements, intemperance, political influence, the social evil, education, etc. The relation of these things to wages. Industry's efforts to put a premium on temperance and character. How do these conditions vary in different industrial operations? Methods of solving the problems indicated.

5. Vocational Guidance and the Education of Employees.
Two to four periods. To what extent does improving a man's education increase his efficiency? Approved methods of educational work with foreign laborers, American workingmen, apprentices, etc.

6. Co-operative Organizations.
Two to four periods. Public and private agencies dealing with problems of industrial betterment. How can the engineer make the best use of such agencies?

7. Legislation and Public Opinion on Industrial Questions.
Two to four periods. To what extent have welfare requirements been incorporated in Federal and State Laws? To what extent is public opinion a determining factor?

8. Industrial Betterment. The programs of typical companies.
Five to ten periods. What has been and can be done along such lines as indicated above? The relation of all such work to efficiency and happiness. Prevention of industrial accidents, profit-sharing and disease. Co-operation and other methods.

9. Scientific Management in Its Human Relations.
Two to five periods. Principles. The human relations in the systems. The efficiency with which "efficiency" is applied. What determines it?

10. How to Handle Men.
Four to eight periods. (To be given by several experts). Examples of industrial leaders who have been successful in handling men. The American working men, the working boy, the foreign laborer, and the colored worker. The Industrial Service Movement idea and its results.

11. Conclusion. The Engineer's Responsibility for Service.
Two periods. In the light of the above what will be your attitude as you graduate? Will your life purpose be wealth regardless of others, or wealth of service for others?

THE INDUSTRIAL SERVICE MOVEMENT

This is just the skeleton outline and is merely suggestive. It is being constantly improved. It seems, however, an important step in the right direction and already a number of the engineering schools and state universities have passed favorably on this course. To be of the most value it should be supplemented by personal friendly contact with workingmen. The combination really helps to give the coming engineer what he needs. Why wait till he graduates? Must he learn some of these things only after costly experience? The Industrial Service Movement answers "No." Seven years ago at Yale Sheffield Scientific School a dozen engineering students taught fifty foreigners English. This was the beginning. The movement has since spread to 250 colleges and 4000 students are now reaching 100,000 working men and boys in many varieties of service—teaching immigrants our language, customs, laws and citizenship, instructing American workingmen in mathematics, mechanics and other subjects, leading clubs of apprentices, etc.

All this and much more is done without compensation, but needless to say these men gain the very compensation they most need in their future careers. It is especially encouraging that many professors are urging their students to supplement classroom instruction by this practical work. Practical business men will surely agree that the professor should be as much concerned about the attitude of his students toward these great problems as about their attitude toward an examination in mechanics.

As I travel around the country I seldom visit a city or an industrial operation without meeting or hearing about some man who "got the idea" back at college. Three thousand such engineering graduates are now on our lists, and the number is increasing at the rate of about 1000 a year. Recently in a western city an industrial welfare committee was organized but no one seemed to know just what to do next. Two men were then discovered who had been in charge of the industrial service work while at college. These men knew exactly what to do and how to do it and the problem was solved. One graduate has charge of all the accident prevention in a great company; another has built a $40,000 "Service Club" for his employees. Several have become welfare secretaries of large business concerns and others have associated themselves with various welfare agencies determined to give their lives to the cause. One of these is leading the Industrial Service Movement in New York City and has 200 college men working as volunteers under his direction; and so it spreads.

Clinic for Industrial Diseases

Following a conference of several hundred physicians, surgeons and representatives of Pennsylvania industries at Harrisburg, May 18, it was announced by Commissioner of Labor and Industry John Price Jackson, that a clinic for the exclusive study of industrial and occupational diseases will be established, with Dr. Alfred Stengle as its head, at the University of Pennsylvania Hospital, Philadelphia, shortly after June 1. An entire ward will be devoted to sufferers from diseases presumed to have been contracted in their employment and from conditions under which they work. Two physicians from the hospital and a score of social service workers will assist Dr. Stengle in his researches.

The findings of the clinic and its investigations will have a direct relation to workmen's compensation in Pennsylvania, as already the Workmen's Compensation Board has been called upon to decide whether some afflicted workers have been injured in their employment or whether they are suffering from diseases not subject to compensation within the meaning of the act.

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THE IRON AGE

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Fair Treatment of Railroads

The railroad question was brought forward quite prominently in the recent convention in this city of the National Association of Manufacturers. It is noteworthy that this association is composed of men whose primary interest in the discussion of railroad affairs is from the standpoint of shippers. At one time the shippers of this country, almost without exception, were either trying to secure special favors from railroad companies or were antagonistic to them because of what they deemed to be unfair treatment. A great change has since taken place, and evils which then existed have been corrected, either through regulation by the Interstate Commerce Commission or by the action of railroad commissions or Legislatures of numerous States. The movement to control railroad management has, however, gone too far, not only for the good of railroad companies, but also for the best interests of the country. Shippers, such as the members of the National Association of Manufacturers, are now ranging themselves among the friends of railroad companies and trying to repair some of the damage done to railroad interests by urging the curbing of further efforts to hamper railroad managers.

An interesting address was delivered at the convention referred to by Charles J. Graham, who is not only president of the Graham Nut Company, Pittsburgh, but is also president of the American Hardware Manufacturers' Association, and thus speaks by authority for a large organization of shippers. In his address he stated that the greatest problem this country is now facing from a commercial and industrial standpoint is the question of proper railroad regulation, which includes proper provision for adequate remuneration, enabling the railroads to provide for the annual expenditures they are now called upon to make to take care of the vast increase in the demand for transportation. Mr. Graham says that their earning power has been so throttled for the past ten years that they have not been able to develop proportionately with the rest of the business interests of the country. He proceeds to state that the prosperity of the railroads is fundamentally the basis of all prosperity, and the question resolves itself "into one of mutual interest between our carriers and the public." He asked the manufacturers to consider "what the future would be for our manufacturing interests and for practically all lines of commercial business if the fixing of our prices were under Government control and they were forced down to such a point as to restrict our earning power to 5 per cent on our investment during such periods as those through which we are now passing." He says there would be just one answer and that would be the complete demoralization of business generally. He asks, "how can we expect the railroads to exist if we require them to develop on a plane that is essentially necessary to handle our largely increased traffic? It is a foregone conclusion that there must be some readjustment and it is up to our commercial organizations to get behind them in their endeavor to create a sentiment in favor of an adjustment which will insure fair rates, just regulation, equitable taxation and last, but not least, reasonable demands from labor." He further says that "railroad regulation must be taken out of politics. The confusing control exercised by forty-eight different States and the Interstate Commerce Commission must be eliminated, as it causes conflict, trouble and useless expense. . . The policy of control must be unified and a strong Federal system of regulation must be substituted for the varying rules of forty-eight unco-ordinated States."

In addition to Mr. Graham's vigorous address a memorial was presented to the convention signed by a large number of firms and corporations, members of the association, urging the adoption of resolutions advocating Federal regulation of railroads to supplant State regulation where the two conflict; that the Interstate Commerce Commission be strengthened and its functions simplified, and that Congress shall enact the rule that the average road shall be permitted such rates as shall allow earnings sufficient to attract new capital for the development of transportation facilities and the opening of new areas. In accordance with this memorial the convention adopted the following resolutions:

Whereas, National business, national development and national defense require the vigorous resumption of improvements, additions and extensions by our railroads; and

Whereas, Such resumption is obstructed by defects in the system of governmental regulation of railroads; therefore be it

Resolved, That the National Association of Manufacturers urges Congress to exert its constitutional power of regulation over these instrumentalities of in-

terstate commerce and thus unify regulation of railroads to the exclusion of unfair intrastate jurisdiction where Federal and State regulation conflict;

Resolved, That we favor legislation which will simplify the functions of the Interstate Commerce Commission and strengthen its organization, to the end that that body may delegate special tasks and regional administration to competent auxiliaries;

Resolved, That we urge Congress to enact as a provision of the interstate commerce law the rule that such rates shall be permitted as will yield the average road earnings sufficient to attract investment for the development of transportation facilities and for the opening up of regions not now served by railroads.

The action thus taken by so important a body of shippers as the National Association of Manufacturers should commend itself to other manufacturing and commercial interests. It is to be hoped that this effort to secure better treatment of the railroads will not only bear fruit, but that the improved conditions thus sought will be brought about as speedily as possible.

The Iron and Steel Works Directory

Through the work of the American Iron and Steel Institute the iron and steel trade again has available a directory to the companies producing iron and steel, with adequate descriptions of the plants and lists of the corporate officials. The last edition of "Swank's Directory," as it was familiarly called, appeared in 1908, and although supplements had been issued in 1910 and 1912 the whole work had become distinctly out of date.

The thanks of the iron and steel trade are due the publishers for arranging the directory in form strictly in accordance with modern conditions. All the information is made available for instant reference. There is no index, because none is required, while reference to the old editions was difficult even with the index, on account of there being reference to many of the companies on various pages. Mr. Swank was a historian, and to him a State was an entity. It gave him a thrill to see how many steel works were to be listed under the name of his native State of Pennsylvania.

The new directory, while a work of great value for the activities of the day, will preserve for future generations a picture of the American iron and steel industry as it existed in 1916. It is a satisfaction to know that the growth of the industry in the United States has been recorded in permanent form, by directories, for nearly sixty years, a period much greater than the life of the steel industry itself. First there was published "The Iron Manufacturers' Guide to the Furnaces, Forges and Rolling Mills of the United States," published by the American Iron and Steel Association, the secretary of the association being Prof. J. P. Lesley, afterward State Geologist of Pennsylvania. Mr. Swank afterward referred to this work as "a monument of patience, industry and research," but as time passed "the book ceased to be a 'guide' and became a history." So have Mr. Swank's directories become a history. In 1865-6-7 the association prepared a complete list of the anthracite furnaces and a partial list of the charcoal, bituminous coal and coke furnaces, rolling mills, forges, bloomaries and steel works. Three men worked on this directory, but it was not complete as to all sections.

On Jan. 1, 1873, Mr. Swank became secretary of the American Iron and Steel Association. One of the functions of the association was to furnish to Congress data upon which intelligent tariff legislation could be based. Mr. Swank recognized at once that statistics of production were necessary, and he addressed himself to the task of gathering them. In the preface to his first directory he remarks in his practical way: "As the collection of accurate statistics of the iron industry of the country is one of the leading objects of the association, it was at once determined to procure a complete list of iron and steel establishments." The list was published in 1874 as a directory, Mr. Swank's first. It was a volume of 106 pages, 6 x 9 in., with a purple paper cover. The production of pig iron in that year was 2,401,262 tons, while the present rate of production approximates 40,000,000 tons; yet the new directory contains only about four times as many pages as that of 42 years ago. Perhaps the largest furnace listed in the 1874 directory was "Lucy furnace, Kloman & Carnegie Bros., Pittsburgh, Allegheny County. One stack, 75 x 20; first put in blast in May, 1872; annual capacity, 28,000 tons." That directory listed 681 blast furnaces, while the present one lists only about two-thirds as many. Thus it can compass a much larger tonnage without corresponding increase in the number of pages.

That these directories do not prove without interest as histories is suggested by one or two references to the "recently abandoned furnaces" of the 1874 directory. A charcoal stack in Sanford County, Alabama, owned by Hale & Murdoch, Columbus, Miss., had been built in 1861 and was abandoned in January, 1870, Mr. Swank observing: "cause, 25 miles from railroad." Another stack, Collins, of the Collins Iron Company, Marquette, Mich., built in 1858, is referred to as "one of the oldest furnaces in the Lake Superior region," but it was abandoned in 1873; "cause, failure of the supply of charcoal." That the furnace had done very good work in its 15 years, however, is testified by the fact that it had made no less than 40,000 tons of pig iron, say 2500 tons a year, allowing for occasional idleness.

Mr. Swank published seventeen directories, and counting the two before his time it is probably correct to say that with the present Institute directory there have been published twenty directories to the iron and steel works of the United States in a period of 58 years, during which time iron production has increased fifty-fold.

A Test of Physical Examination

Many of those interested in the compulsory physical examination of workmen have feared the effect of the system in times when labor is in great demand and men can pick and choose in securing their employment. Experience of the past year, which certainly has given a fair test on that score, has proved that few decide against applying for work because as a preliminary they must prove themselves physically fit. What happened at a great metal-working plant in which there is a variety of operations, employing of late more than 6000 men, is an interesting commentary on the subject.

The working force was brought up from far below normal to maximum, and maintained there, with only two men refusing to submit to examination. These may have known their physical condition and realized that they could not hope to pass. The same may have been true of some of the unknown number who stayed away. But the fact is that the percentage of those prejudiced against the examination was negligible.

While exact statistics are not obtainable, the applicants for work rejected because of physical disability comprise about 10 per cent of the total. The figure is smaller than many have supposed. A large proportion of those who were found wanting suffered from troubles of the heart, eyes and kidneys, and from hernia. In a large majority of the cases the serious causes for rejection were hidden and would not have been noted at an employment office.

The percentage of sub-normals, to use the term commonly applied, is rather smaller among the new men than in the working force examined in the early operation of the system. This was to be expected, because a plant, especially if long established, includes on its payroll old men and others who have been kept along, but would not be hired as new employees. They either have been given labor suited to their condition, or have been working on not knowing that weaknesses had developed which put them in constant jeopardy of serious consequences.

It is occasionally said that compulsory physical examination is not wholly fair because as a consequence some men are deprived of their employment. But there is the other side. No man should be permitted to labor under conditions that are physically hurtful. For example, the man with heart disease should not be allowed to work where it would mean death to him to have an attack of his trouble. Many cases of just this liability have been discovered in the plants where the system is established. The workman should be informed of his weaknesses. They may be corrected if taken in time. If continued in his old work his remaining days of wage-earning might be few. New environment and employment better suited to his condition would be likely to prolong them.

CORRESPONDENCE

Nitric Acid from Sulphate of Ammonia

To the Editor: In May 18 issue you published a letter from Henrik Owesen, in which he says I made the incorrect statement that recovery of nitrogen from the air was a German invention. The following is the paragraph referred to:

"I was told in Germany that they were securing the nitrogen necessary for munitions by the direct electric arc process and by releasing the ammonia from the sulphate of ammonia and oxidizing it into nitric acid. This latter process, invented some years ago by a German chemist, was not commercially successful on account of the cheapness of Chilian nitrate, but since the outbreak of the war it is one of the principal sources of supply."

It seems quite plain to me that the invention referred to is the conversion of ammonia in sulphate of ammonia into nitric acid.

T. C. CLARKE.

New York, May 18, 1916.

Latest Changes in Foreign Tariffs

A report on the latest changes and developments in foreign tariffs has just been issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce. In addition to the usual notices of recent changes, actual and proposed, in import and export duties, customs regulations, and internal taxes of foreign countries, this publication contains the more important embargo and contraband provisions, regulations affecting commercial travelers in Central America, and articles on a number of other subjects connected with foreign tariffs. There is a timely discussion of the anti-dumping legislation of Australia, Canada, and the Union of South Africa, and an interesting article on the probable revival of German commercial influence in Russia after the war. The report is designated "Foreign Tariff Notes No. 19," and may be had free of any charge upon application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or to any of its district offices.

Manufacturers Organize Cost Association

Under the direction of members of the Illinois Manufacturers' Association there has been organized the Illinois Manufacturers' Cost Association of which George H. Frazier of Montgomery, Ward & Co. has been chosen president and William D. Truesdale, Inland Steel Company, vice-president. At the initial meeting of the new association, held at Chicago, May 16, the principal speaker was Edward N. Hurley, vice-chairman of the Federal Trade Commission, who again emphasized, as he has on many previous occasions, the necessity of an aggressive campaign against price cutting and for the fostering of more intelligent methods of cost keeping. The new organization has been created to serve as one of the mediums for the advancement of this propaganda.

In Favor of Net Ton on Old Rails

The Railway Storekeepers' Association, in its thirteenth annual convention, held at Detroit, Mich., May 16, approved the recommendation of its committee on rails for the adoption of the ton of 2000 lb. in reporting and accounting for quantities and values of rails received, on hand and issued. The committee, in its report, stated that the use of the net ton would undoubtedly greatly simplify the recording and accounting for rails and therefore recommended that the association should take up the question with the other associations representing the engineering and accounting departments of railroads with a view to joining in the ultimate object of discontinuing the gross ton and adopting the net ton.

At a recent special meeting of the stockholders of the New Process Steel Corporation, Lancaster, Pa., the capital stock was increased from $50,000 to $1,000,000, consisting of $500,000 preferred and $450,000 common. This expansion is to provide for the handling of greatly increased business. It was also decided to change the name of the corporation to the Lancaster Steel Products Company, as more representative of the lines of goods it manufactures. The present officers of the company will continue in charge, as follows: President, H. B. Cochran; vice-president, E. B. Hite; secretary, H. L. McClure; treasurer, John S. Cochran. It produces polished drill rods, alloy steel and special cold drawn shapes.

According to a Montreal report the famine in steel in Canada is becoming more marked every day. Most of the larger Canadian companies have practically sold their entire output for the current year and are now booking orders for 1917 delivery.

The new mill of the Interstate Iron & Steel Company at Marion, Ohio, for the rolling of high-carbon bars from rail steel, was started May 22 and will be producing material for the market, it is expected, within a few days.

FOR FIXED RESALE PRICES

National Chamber of Commerce So Votes—Majority of Congress Reported Favorable

WASHINGTON, D. C., May 23, 1916.—The Chamber of Commerce of the United States, by a vote of 693 to 237—almost exactly three to one—has declared for legislation legalizing the fixing of resale prices by manufacturers of goods identified by trademarks, brands, etc. No less than forty-one States, Alaska, Hawaii, the District of Columbia and the American Chamber of Commerce in Paris, France, are represented in the referendum poll ordered on April 1 and closed on May 16.

Two resolutions were submitted for indorsement. The first proposed that "there should be federal legislation permitting the maintenance of resale prices, under proper restrictions, on identified merchandise for voluntary purchase made and sold under competitive conditions." The second resolution suggested that "federal legislation should take the form of an amendment to the Trade Commission act defining the conditions under which price cutting is an unfair method of competition and authorizing the Federal Trade Commission to prevent such price cutting in interstate and foreign commerce." On this question 549 members voted in the affirmative and 289 in the negative. Nearly 100 of those who voted on the main question refrained from expressing any view on the secondary resolution. Inasmuch as the by-laws of the National Chamber stipulate that resolutions must be adopted by a two-thirds vote, this secondary proposition was not carried, a fact which may be attributed to the desire of many members of the chamber for the enactment of the Stevens bill which provides a different method of preventing price cutting from that proposed by the chamber.

In making public the resolutions of the referendum the chamber calls attention to the conclusions reached by its special committee appointed to consider this question, as follows:

1. A properly regulated system of price maintenance on identified merchandise made and sold under competitive conditions puts the emphasis in competition upon quality and service, while at the same time it provides for the public adequate protection against extortion.

2. Price maintenance under these conditions preserves the social advantage of an adequate incentive to invent and devise new products.

3. Price maintenance under these conditions serves to prevent monopolistic control of production processes by powerful distributors.

4. Price maintenance under these conditions preserves the social advantages of such distribution conveniences as are represented by neighborhood stores and by small but skillful merchants. In some trades it is the sole guarantee of the preservation of the accepted system of distribution. For instance, it assures the preservation of book stores as individual enterprises. If the social value of such factors as these is less than their economic cost they are not worth preserving. But who is ready at this time to encourage their annihilation? It is noteworthy that the agitation in favor of restoring to producers the control of resale prices originated with the small, independent retailers, and that most of the opposition to it comes from the large and powerful retail concerns.

5. The right of the producer to set resale prices is an accepted principle of business law. It has been restricted recently in this country by close decisions of the Supreme Court, none of which was decided on the basis of the general principle alone. We believe that in the long run the public interest will be best served by legislation specifically permitting this method of doing business in identified articles made and sold under competitive conditions.

The House Committee on Interstate and Foreign Commerce has decided to give hearings on the Stevens price maintenance bill beginning May 30. These hearings have been obtained as the result of persistent effort on the part of the friends of this measure to overcome the opposition of Chairman Adamson and other members of the committee. The advocates of this legislation assert that more than a majority of both houses are committed to it in writing. The committee has also decided to grant hearings on the Barkley bill to prohibit misbranding in connection with those on the Stevens bill. The Barkley bill is drawn on the lines of the federal pure food and drug law and extends the principles of that statute to merchandise of every description.

Senator Borah of Idaho has introduced in the Senate a new bill to legalize price fixing that will certainly attract a great deal of attention. Its general features are similar to those of the Stevens measure, but a radical provision has been added permitting the Federal Trade Commission, of its own initiative or upon a petition in writing by a citizen

To fix and establish a fair and reasonable price at which any article coming under the terms of this act shall be sold, and shall for that purpose have access to all records, books, papers, accounts, secret processes and formulas of the proprietor, manufacturer or producer of such article, which said commission shall deem necessary in order to enable it to fix and establish such price; that a price once fixed and established shall not be raised or increased without the authority of the commission so to do; that any one increasing the price over that fixed by the commission shall be punished by a fine of not more than $1,000 or by imprisonment not less than six months or by both such fine and imprisonment.

This feature of Senator Borah's bill will certainly be strongly opposed by the majority of those advocating the Stevens bill. W. L. C.

Manufacturers' Association Elects Officers

At the annual meeting of the board of directors of the National Association of Manufacturers at the Waldorf-Astoria, New York City, on May 18, following the conclusion of its twenty-first annual convention, Col. George Pope of Hartford, Conn., was re-elected for his fourth consecutive term as president of the association. Other officers re-elected are the treasurer, Henry Abbott; general manager and assistant treasurer, J. P. Bird; secretary, George S. Boudinot, all of New York.

The board of directors for the ensuing year, including the officers, will consist of the following: J. G. Battelle, Columbus Iron & Steel Company, Columbus, Ohio; E. B. Leigh, Chicago Railway Equipment Company, Chicago; Charles L. Taylor, Taylor & Fenn Company, Hartford; Capt. William P. White, Lowell Paper Tube Corporation, Lowell, Mass.; J. E. Edgerton, Lebanon Woolen Mills, Lebanon, Tenn.; F. B. Farnsworth, Eastern Machinery Company, New Haven; Isaac W. Frank, United Engineering & Foundry Company, Pittsburgh; John Kirby, Jr., Dayton Mfg. Company, Dayton, Ohio; Stephen C. Mason, McConway & Torley Company, Pittsburgh; Constant Meese, Meese & Gottfried Company, San Francisco; C. Edwin Michael, Virginia Bridge & Iron Company, Roanoke, Va.; A. J. Lindemann, A. J. Lindemann & Hoverson Company, Milwaukee; M. W. Mix, Dodge Manufacturing Company, Mishawaka, Ind.; Carleton A. Chase, Syracuse Chilled Plow Company, Syracuse, N. Y.; Enos Paullin, Ferracute Machine Company, Bridgeton, N. J.; Adolph Mueller, H. Mueller Mfg. Company, Decatur, Ill.; George D. Selby, Selby Shoe Company, Portsmouth, Ohio; E. C. Spear, Cheney Bigelow Wire Works, Springfield, Mass.; Albert J. Thornley, Narragansett Machine Company, Providence, R. I., and John Trix, American Injector Company, Detroit.

Carriage, wagon and automobile builders of St. Louis and vicinity are preparing to take their difficulties in obtaining steel as well as its high price before the Federal Trade Commission. Secretary A. E. Spaete of the St. Louis organization presented the matter in a preliminary way through Congressman W. L. Igoe, but was advised that their statements did not form a sufficient ground for investigation. Efforts are now being made to obtain evidence which will justify the commission in considering the complaint.

The report of the Skoda Works Company of Austria for 1915, one of that country's largest steel plants, states that 22,000 workmen are employed against 14,000 a year ago. At present the works are running at full capacity.

TAVENNER BILL REPORTED

Majority and Minority Reports Presented with This Bill

WASHINGTON, D. C., May 22, 1916.—Majority and minority reports on the Tavenner bill prohibiting the use of scientific shop management systems in Government establishments have been filed in the House by the Labor Committee. The majority report has been presented by Representative Keating of Colorado, who presided at the recent hearing granted to the Committee of Ten appointed by the engineering societies to oppose the pending measure. Representative Browne of Wisconsin has filed the minority report. There is no official record showing how the committee is divided for or against the bill.

THE MAJORITY REPORT

The chief feature of the majority report is an attack on General Crozier, chief of the Bureau of Ordnance of the War Department, because of his failure to extend the prohibition of scientific management contained in the last army appropriation bill to work done at the Watertown arsenal under the fortifications bill, which contained no such provision. He is also assailed because of the opportunity which he gave the employees at Watertown and Frankford to protest against the Tavenner bill before that measure was adopted as a rider on the army and navy bills in the last Congress.

As in the case of much of the testimony against scientific management taken by the House Committee, this report grossly misrepresents the function of the stop watch, seeking to make it appear that each individual operative is required to work under a supervisor with watch in hand. Much of the report is made up of extracts from the various reports of the Federal Commission on Industrial Relations, but, as these extracts are chiefly the testimony of labor representatives, they are neither illuminating nor convincing. The narrow scope of the majority report and the extent to which it avoids discussion of the real merits of scientific shop management may be gathered from the following statement of its "conclusions":

> The system so persistently urged by General Crozier involves a fundamental, not to say revolutionary, change (a) in determining what is a reasonable day's work for an employee in the national arsenals and workshops and (b) in the method of compensating the workers, to wit, the substitution of the "bonus" or "premium" system for the age-old "day's-pay" system. The workers affected seem to be almost unanimous in their opposition to the change. They insist it will be oppressive to them and will be without benefit to the Government. So intense is this feeling that an attempt to install the system in all the Government workshops would, in the judgment of your committee, lead to very serious consequences. In view of these well-established facts, it seems to your committee it would be the height of folly to permit General Crozier to persist in his plan. Apparently, the only way to restrain him is to enact the bill under discussion, and your committee trusts the House will take prompt and favorable action.

THE MINORITY REPORT

The minority report presents very forcibly the chief objections to the Tavenner bill. The author of the report states that in dissenting from the views of the majority of the committee he is not defending any particular system of scientific management. Continuing he says:

> Under the day-work system an unscrupulous, selfish employer has it in his power to dismiss a workman because he does not do a day-and-a-half work in one day, and thus keep his workmen in fear of losing their jobs fully as much as he would under the time-study system. Under the time-study system a workman can show that he is doing as much as the other men in his own factory, and other like establishments, which is a comparison he cannot make when working by the day.
>
> Any system that the ingenuity of man can devise can be abused by an employer as long as he has the right that every employer has, to discharge the workmen. Even Government employees under civil-service appointment can be discharged for inefficiency and the good of the service, two very elastic words that can be stretched so that it amounts to a very small protection for an employee. The employees in the arsenals or shipyards can be arbitrarily discharged.
>
> It has been demonstrated that it is profitable for an employer of labor to treat his employees fairly and generously, and that by so doing he will receive more efficient service from them.

The report expresses the belief that the men who are representing labor and are demanding the passage of the Tavenner bill do so in good faith but are mistaken and are more apprehensive of what they think may be the result of efficient management than what has really happened or will happen. This has been the history of the agitation on the part of the laboring classes and those who represent them in the attitude they have taken toward many inventions, especially labor-saving devices. The mobbing of Samuel Arkwright, the inventor of the loom, the opposition of the owners of sailing vessels to Fulton's steamboat, and the movements against the introduction of the sewing machine, the linotype machine and other labor-saving devices are cases in point.

Concerning the necessity of time study the report says:

> This bill prohibits all time study. The three great components of the cost of any article are labor, material and overhead or expense account. Labor, of course, is the most important component part of the cost of any article. The knowledge of the cost of producing an article is essential to fixing the selling price of the article. The ascertaining of the cost of labor in producing any article is determined by the time it takes in producing the article at the going wage. Time is, therefore, the fundamental and vital factor in determining the price. Under the old system of compensation, the principle of time was recognized when men were paid by the day, week or hour. For fifty years the "in and out" clock has been used which, of course, is a time-measuring device in a general way. The stop watch is used principally as a laboratory instrument. It is seldom used in the plant by a foreman standing over the workman timing him. It is used by the way of experimenting in taking the operation that is to be performed and making a laboratory study of it before setting the time or determining what is a reasonable time in which to do or perform the operation.

The minority report emphasizes the peculiar hardships the Tavenner bill would impose upon Government employees and the increased burdens to be borne by the taxpayers. Quoting from General Crozier's testimony, it states that the labor cost in the Watertown Arsenal, under the Tavenner bill, would be doubled and with the loss of premiums the laborer would not receive nearly the amount of wages he receives to-day. To legislate against the premium and bonus system of paying labor is to legislate against the opportunity of a working man forming a sort of partnership in connection with his work. Profit-sharing cannot be resorted to in a Government establishment but premiums may be given a man to stimulate his intelligence and reward him for his industry.

The necessity of preparing to meet the extraodinary industrial conditions that will follow the war in Europe is emphasized. Preparation must be made, it is said, for an industrial war of far-reaching consequences. "The American workman," the report declares, "should be backed by the greatest efficiency that human ingenuity can devise. Great Britain has presented the spectacle of a great industrial nation suffering severely in a national crisis from industrial inefficiency and restriction seriously endangering her capacity for self-defense. The United States may well learn, by the moral of an experience not her own, to avoid at this time the deliberate public condemnation of efficiency in the public service by threatening with fine and imprisonment officials who have consecrated their lives to the service of their country, if they endeavor to apply methods which in private establishments are daily demonstrating their economic and social value."

No plans have yet been made for the consideration of the Tavenner bill, and, as already foreshadowed in this correspondence, it is probable that the measure will first be brought forward as a rider to be attached to the national defense and the chief supply bills. The House Post Office Committee, to which the text of the Tavenner bill was recently referred by Senator Hughes of New Jersey as an amendment to the annual Post

Office appropriation bill, has reported that measure without the proposed rider, doubtless in deference to the protest of Postmaster General Burleson, who is endeavoring to install scientific systems throughout the postal service. Senator Hughes will seek to attach the rider when the Post Office bill is called up on the floor of the Senate. W. L. C.

Westinghouse Electric Annual Report

The annual report of the Westinghouse Electric & Mfg. Company for the year ended March 31, 1916, issued last week, shows gross earnings of $50,269,239 and net manufacturing profit of $9,429,895. The net income available for dividend after the inclusion of interest and discounts and the payment of fixed charges was $9,666,788.

Guy E. Tripp, chairman, explains that the results were obtained in part from orders for war munitions, the shipments on account of which amounted to $8,578,266. Total orders for war munitions booked up to March 31 were approximately $96,527,000.

The value of orders received during the year outside of war contracts was $58,218,171, and the value of unfilled orders on March 31 for regular products was $22,097,995, against $5,464,965 at the same date last year.

The company is now employing 31,641 persons as against 18,311 last year. Most of the work on war contracts is being carried on at Pittsburgh, East Pittsburgh, Springfield, Mass., and Philadelphia.

Following is a condensed balance sheet (except for the New England Westinghouse Company) as of March 31:

Assets

	1916	1915
Property and plant	$21,201,304	$19,882,870
Sinking fund	706	337
Investments	15,662,751	17,683,093
Cash	8,184,941	8,855,280
Cash on deposit for redemption of matured obligations, etc.	1,321,615	125,409
Notes and accounts receivable	12,358,030	9,646,386
Working and trading assets	18,850,947	13,307,795
Other assets	4,852,648	6,926,501
Total	$82,432,945	$76,427,374

Liabilities

Preferred stock	$3,998,700	$3,998,700
Common stock	52,644,800	37,325,087
Funded debt	3,283,000	19,448,000
Walker Co. bonds	.....	850,000
Collateral notes	2,720,000	2,720,000
Long term notes	96,250	98,750
Real estate purchase money mortgage	210,000	210,000
Accounts payable	5,178,526	2,851,093
Dividends accrued	859,649	442,814
Advance payments on contracts	2,111,035	285,083
Unpaid debenture certificates, etc.	1,321,615	125,109
Reserve	762,662	599,323
Profit and loss—surplus	9,246,707	7,473,411
Total	$82,432,945	$76,427,374

For the three months ended March 31, 1916, the Charcoal Iron Company of America reports profits of $220,739 and a balance after interest on borrowed money and reserve of $179,015. The balance sheet shows that during the nine months ended March 31, 1916, $270,672 has been carried to surplus. For the last half of 1916 the company had at Dec. 31, 1915, unfilled orders amounting to 4662 tons at an average selling price of $17.66 per ton, and at March 31, 1916, the unfilled orders for the second half delivery were 37,200 tons, at an average selling price of $18.74; also at March 31 unfilled orders for delivery in 1917 of 1100 tons at $19 and since that date has sold considerably more.

The Canadian Locomotive Company, Kingston, Canada, has closed an order for 30 locomotives of an exceptionally large type to be used on the Canadian Government systems. The company's locomotive organization has not been disarranged by its new shell-making activities, and a very fair amount of locomotive business has been carried on the past year. Aemilius Jarvis, president of the company, recently announced that a request had been received by cable to quote prices on a new order for 600 locomotives for the Russian Government.

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WAR MATERIAL LEGISLATION

Congress Gives President Power to Take Private Plants if Necessary

WASHINGTON, D. C., May 23, 1916.—Innovations of the most radical, not to say revolutionary, character in the policy of the Government with respect to the acquisition of war material are provided for in the army reorganization bill which, after nearly five months of continuous consideration, has finally passed both Houses of Congress. The mandatory provisions of this measure must be rendered effective, however, by the enactment of the annual military appropriation bill which will provide all the funds to be disbursed by the War Department, except such as are carried by the fortifications bill, and which has not yet been completed by the House Committee on Military Affairs. It is a reasonable assumption, however, that as both the army reorganization and the military appropriation bills are in charge of the same committee of the House, adequate provision will be made for the enforcement of all the extraordinary provisions which have just been agreed upon.

Under the title of the "purchase or procurement of military supplies in time of actual or imminent war" the measure empowers the President to use drastic methods to compel manufacturers to supply the Government's requirements. This section is in part as follows:

> The President, in time of war or when war is imminent, is empowered, through the head of any department of the Government, in addition to the present authorized methods of purchase or procurement, to place an order with any individual, firm, association, company, corporation, or organized manufacturing industry for such product or material as may be required and which is of the nature and kind usually produced or capable of being produced by such individual, firm, company, association, corporation, or organized manufacturing industry.
>
> Compliance with all such orders for products or material shall be obligatory . . . and shall take precedence over all other orders and contracts theretofore placed . . . and . . . the responsible head or heads thereof owning or operating any manufacturing plant, which, in the opinion of the Secretary of War shall be capable of being readily transformed into a plant for the manufacture of arms or ammunition, or parts thereof, or other necessary supplies or equipment, who shall refuse to give to the United States such preference in the matter of the execution of orders . . . or who shall refuse to furnish such arms, ammunitions, or parts of ammunition, or other supplies or equipment, at a reasonable price as determined by the Secretary of War, then, and in either such case, the President, through the head of any department of the Government, in addition to the present authorized methods of purchase or procurement herein provided for, is hereby authorized to take immediate possession of any such plant or plants, and through the Ordnance Department of the United States Army, to manufacture therein in time of war, or when war shall be imminent, such product or material as may be required, any individual, firm, company, association, or corporation, or the responsible head or heads thereof failing to comply with the provisions of this section shall be deemed guilty of a felony, and upon conviction shall be punished by imprisonment for not more than three years and by a fine not exceeding $50,000.
>
> The compensation to be paid to any individual, firm, company, association, corporation, or organized manufacturing industry for its products or material, or as rental for use of any manufacturing plant while used by the United States, shall be fair and just.

The bill also provides for the mobilization of the industries of the United States capable of supplying war material. The Secretary of War is authorized to make a complete list of all privately owned plants equipped to manufacture arms or ammunition or the component parts thereof. To facilitate the execution of this provision the President is authorized in his discretion to appoint a Board on Mobilization of Industries, non-partisan in character, and to take all necessary steps to provide for such clerical assistance as he may deem necessary to organize and co-ordinate the work. With a view to securing authoritative information as to the results of the policy heretofore pursued by the Government in the manufacture and purchase of war material, the bill authorizes the appointment of a special commission to study this subject and to recommend the course to be pursued hereafter. This provision of the bill is as follows:

> The Secretary of War is hereby authorized to appoint a board of five citizens, two of whom shall be civilians and three of whom shall be officers of the army, to investigate and report to him the feasibility, desirability and practicability of the Government manufacturing arms, munitions and equipment, . . . showing also what the Government plants and arsenals are now doing in the way of manufacturing arms, munitions, and equipment, and what saving has accrued to the Government by reason of its having manufactured a large part of its own arms, munitions, and equipment for the last four years. And the Secretary of War is hereby directed to transmit said report to Congress on or before Jan. 1, 1917.

The army reorganization bill also contains an important declaratory provision authorizing the Secretary of War to use such funds as may hereafter be appropriated in the regular annual military supply bill for the purchase of equipment for the manufacture of material in private establishments. It is as follows:

> That the Secretary of War be, and he is hereby, authorized to prepare or cause to be prepared, to purchase or otherwise procure, such gages, dies, jigs, tools, fixtures, and other special aids and appliances, including specifications and detailed drawings, as may be necessary for the immediate manufacture, by the Government and by private manufacturers, of arms, ammunition, and special equipment necessary to arm and equip the land forces likely to be required by the United States in time of war: Provided, That in the expenditure of any sums appropriated to carry out the purposes of this section the existing laws prescribing competition in the procurement of supplies by purchase shall not govern, whenever in the opinion of the Secretary of War such action will be for the best interest of the public service.

The proviso above quoted has been inserted at the suggestion of the Ordnance Bureau of the War Department to enable it to allot contracts in its discretion irrespective of the lowest bid. The amount to be appropriated for the execution of this section has not yet been determined by the military committee, but the estimate for the purpose is $5,000,000.

The military appropriation bill which is to render the army reorganization bill effective is nearing completion and will probably be reported by the military committee early in June. The fortifications bill is already on the House calendar, but the naval bill will probably not receive consideration in the House before July.

W. L. C.

Hoover Ball Company Still Expanding

The Hoover Steel Ball Company, Ann Arbor, Mich., has decided upon a further expansion of its plant to include a manufacturing building, 40 ft. x 400 ft., and a two-story office building. The factory addition will make a total of five manufacturing buildings for this year. It will then have a total of 102,306 sq. ft. of manufacturing floor space. The company was organized March 1, 1913, starting with a manufacturing floor space of 20.000 sq. ft. The additional building will be completed and in operation by October 1, and its production will swell the total output to from 40,000,000 to 45,000 000 balls per day. The plant will then be the largest in the world devoted exclusively to the manufacture of steel balls. All buildings have been constructed by the company's own engineering force. No outside contracts have been let. The plant is being operated entirely by electricity furnished by water-power, and is using now approximately 1200 hp. All buildings are of fireproof construction, brick and concrete, and have a complete sprinkler system, with two sources of water supply.

The David Lupton's Sons Company, Philadelphia, has opened a direct sales office in room 1150 Oliver Building, 141 Milk Street, Boston, Mass. Harry Wolf, with factory and sales experience, represents the company as sales engineer. H. R. Wilkinson, New York manager, now has general supervision of New England sales, and direct Lupton service, which has proved so successful in New York and Connecticut, is extended through New England.

Book Reviews

Iron and Steel Works Directory of the United States and Canada, 1916. Pages 437; 5½ x 8¼ in. Published by the American Iron and Steel Institute, 61 Broadway, New York. Price, $12. Sold also by the Book Department of the David Williams Company.

The last complete directory of the iron and steel works of the United States was published in 1908. A supplement appeared in 1910 and a second supplement in 1912. The industry has long wanted such a directory as it now has and is well repaid for waiting for it. A striking departure is that all company names, whether in blast furnace, steel works, rolling mill, steel foundry or other lines, are listed in alphabetical sequence, and there is no separation of the large consolidations from the smaller companies. With the organization of the company are given data as to plant and equipment. A number of important additions appear here. Blowing capacity of blast furnaces is given, and details of blowing engines, and boilers, slag disposal, sintering and nodulizing plants, etc. Concerning rolling mills, more exact descriptions are given of heating furnaces and rolling equipment. The alphabetical arrangement does away with the trouble users of the old directory had in being compelled to go from one section of the book to another and in consulting various indexes. The supplementary lists of blast furnaces, steel works, steel-casting plants and rolling mills arranged by States and localities are an excellent feature. The capacity ratings are more exact than they have ever been, some of the producers apparently having stated their capacity by giving approximately the actual production in a twelvemonth. There are also lists of companies manufacturing galvanized sheets, tin plates, cut and wire nails, wrought pipe, tool steel, hoops and bands, rails, structural shapes. In a good many cases the names of purchasing agents of companies are given, a feature many users of the book will find desirable. The Canadian manufacturers are listed in their alphabetical places in the main directory, but it is possible to find the Canadian plants as a group by referring to the geographical summary. In this latter the States appear in alphabetical order instead of in the old confusing grouping which brought New England States first, then the Southern States and later the Middle West and the far West.

Getting the Most Out of Business. By E. St. Elmo Lewis. Pages, 483, 5½ x 8⅛ in. Published by the Ronald Press Company, 20 Vesey Street, New York. Price, $2.

Mr. Lewis has brought out a most interesting volume. He has shown how business, when approached in the right spirit, may be made to give almost all the pleasures of a game or contest rather than seem like drudgery. And throughout the book he preaches the gospel of efficiency. He hammers the inefficient man, the old fogy and rule-of-thumb methods.

The points made in the book are driven home by means of illustrations drawn from a wide range of subjects. The author seems to be equally familiar with the conditions of the large manufacturing plant, the department store and the cross-roads country grocer. The book is written in a breezy and interesting style as may be judged from the headings of the several parts into which the volume is divided. These are: Making the Right Start; What's the Use?; The Rules of the Game; On the Road to Damascus; Loyalty to the Vision of Things Well Done; A Paper of Brass Tacks; Who Says So?; Thinker, Doer & Co.; One Foot Inside the Door; That Letter to Hooker; The End of the Rainbow; Ich Dien.

Having once taken up the book the reader is reluctant to lay it down, and when he finally turns the last page he feels that his reading has been not only a profit but a pleasure.

Rules for Testing Power Plant Apparatus

A new set of testing codes has been issued by the American Society of Mechanical Engineers. It comprises a book of 215 pages of rules and codes prepared by the power test committee of the society under the chairmanship of George H. Barras, consulting engineer, Boston. It represents six years' work of revision of the former testing codes of the society. It covers boilers, reciprocating steam engines, steam turbines, pumping machinery, compressors, blowers and fans, complete steam power plants, locomotives, gas producers, gas and oil engines and water-wheels. Among the general matters covered are standards relating to capacity, efficiency and economy and rules are given for sampling and drying coal and ash and for sampling steam and gases. An unusually valuable part of the book, comprising about 175 pages, are 38 appendices on different apparatus and their use in testing and on how to study results of tests.

French Imports of Metals and Machinery

Some of the important exports and imports of France in 1915, compared with 1914, as given by U. S. Consul General A. M. Theckara of Paris, were as follows:

	1914, Metric Tons	1915, Metric Tons
Imports:		
Automobiles, commercial, No.	454	20,395
Automobiles, passenger, No.	1,927	1,443
Coal	15,430,258	19,067,743
Copper, raw	78,522	111,400
Iron and steel	109,550	927,358
Iron and steel machinery	149,560	100,976
Iron and steel tools and metal work	46,810	164,730
Iron ore	1,044,160	397,348
Tin	7,216	9,003
Exports:		
Iron ore	4,828,592	94,864
Machinery	57,738	15,475
Tools and metal goods	100,977	28,220
Pig iron, iron and steel	419,142	152,117

The figures for iron ore and iron and steel relatively reflect the changed condition due to the war.

Preparations are being made for the laying of the keels for two 3000-ton ocean-going freight steamers to be constructed by the Western Drydock & Shipbuilding Company, Fort William, Ont., Canada. Their dimensions will be as follows: Length over all, 261 ft.; length between perpendiculars, 251 ft.; beam, 43½ ft.; depth, 28 ft. 2 in. Each ship will be equipped with triple-expansion engines supplied with steam by two Scotch boilers. The vessels will be constructed to Lloyd's inspection.

The Chicago Association of Commerce is sending to all of the manufacturers of that city a request to file with it a record of all inactive or surplus stocks of materials and likewise a statement of the quantities and kinds of materials of which there is a shortage. Upon the basis of these reports it is hoped that there may appear an opportunity for exchanging which will in some degree relieve the stress of materials shortage under which many manufacturers of that city are laboring.

C. F. Just, the Canadian Trade Commissioner in Petrograd, Russia, advises his government that a large number of steam road rollers and other machinery will be wanted by the Russian Government in connection with its roads construction program. A number of 12-ton rollers are required at once. He also reports that the Russian Government wants tenders for five 5-ton locomotive cranes and working parts for 10 ladder dredges, with quotations f.o.b. New York.

At the annual meeting of the Norma Company of America held recently in New York, W. M. Nones was elected president and treasurer. He had been secretary-treasurer as well as general manager of the company, and in his new position will continue to exercise the general management. The company started five years ago as an importer and now manufactures ball, roller, thrust and combination bearings.

A dearth of machinery is now seriously felt in the Ural mining works of Russia, according to the British vice-consul at Ekaterinburg, and it is feared the allied and neutral countries will not be able to replace the great quantity Germany formerly supplied. It is difficult for Russian buyers to obtain information as to where special machinery, badly needed, can be purchased.

BULLARD "MAXI-PAY" PLAN

High Minimum of 55 Cents an Hour—Six Classes of Employees

The Bullard Machine Tool Company, Bridgeport, Conn., has announced a plan designed to enable employees to secure a wage return to the full extent of their ability and productiveness. The lowest wage paid any employee will be 25c. per hour, this for the unskilled labor, and the plan is such that a man's earnings are determined wholly by his showing and his efficiency record. The company has taken this step after an extended study of the situation. Vice-President Stanley H. Bullard authorized the following statement of the working out of the plan and the causes which brought it into being. The opening paragraphs are an outline of the situation in which manufacturers of highly specialized machinery find themselves in this time of high wages and great shortage of skilled workers. The minimum hourly rates for the different classes are about on a par with the rates in most New England factories making high grade machinery:

"Skill and proficiency are the actual foundations of low costs of production—not a low hourly wage rate. Skill at the machinist's trade may be acquired by years of application in any of a thousand shops, but proficiency in the construction of a highly specialized product like ours can be attained only by long association with that product, through which may develop a knowledge of its workings and an appreciation of the exacting requirements of the construction of the various details which enter into it.

"The longer a man is with us the better is his work because of his development in skill and his greater knowledge of the special needs in the building of our machines, and, in the final analysis, that man's work costs less, even though his hourly wage be considered high, because of its superior quality and the greater efficiency with which it has been produced.

"Our Maxi-Pay wage plan has been developed from these basic facts. It recognizes the value of skill and proficiency and provides suitable reward for their attainment. It presents a high mark for the good man to aim at and opens the door of opportunity for advancement to all in our employ—even to those who are now unskilled.

SIX CLASSES OF EMPLOYEES

"By close personal study of the individuals in our organization and a careful checking of their records, E. P. Bullard, Jr., our president, in conference with the shop executives and foremen, has grouped the men in six distinct classes, four of which cover the mechanics, one the apprentices and one the non-mechanical and unskilled members of our force. Future advancement will be made the subject of equally careful and fair consideration.

"In Class AA, from which will be recruited our future shop executives and foremen, are grouped the sub-foremen and leaders in charge of working gangs of mechanics. The maximum wage rate is limited only by ability, proficiency and occupation, while a high minimum of 55c. per hour has been set.

"Class A, comprising mechanics of highest skill, forms the basis of promotion to Class AA, and, like it, has an unlimited maximum hourly rate dependent only on ability, and a minimum rate of 50c.

"Mechanics of good average ability are rated in Class B, for which a rate of 45c. per hour has been established. Advancement in grade will be the logical reward of proved merit and diligent service.

"In Class C have been grouped those mechanics of lesser skill, but who, by their records, show merit and possibilities of development which will warrant advancement to the higher classes. The hourly rate is 40c.

APPRENTICE RATE ADVANCED

"All apprentices, both special and regular, are grouped in Class D and, as their terms expire, promotion will be promptly made to the classification for which they have qualified. The apprenticeship rates are advanced approximately 10 per cent.

"The non-productive skilled labor, and the unskilled labor, such as truckers, cleaners, sweepers, etc., have been grouped in Class E which has a minimum rate of 25c. per hour and a maximum which is limited only by occupation and skill and proficiency therein. In recruiting this force preference will be shown to those who can speak and write the English language and who show possibilities of development and advancement.

"To the unskilled there is offered the opportunity to acquire skill through the regular or special apprenticeship courses in Class D.

"Our eventual aim and hope is to have a mechanical organization composed mainly of AA and A men, with B, C and D men in sufficient numbers only to provide for natural growth and expansion and make up for such small losses as are bound to occur in any large organization.

"As a further incentive to continued and regular attendance we will maintain our continued service bonus payments of 10 per cent of full weekly wage. This is in no sense a part of the hourly rate nor is it considered by us as a wage payment. It is a distinct reward for regular and continued service and is made possible only by the fulfillment of production schedules which could not otherwise be maintained."

Marine Boiler Steel Requirements

Marine plate manufacturers, boiler makers and shipbuilders are joining in a movement to secure a modification in the rules exacted by the Government as relates to the physical requirements, marking and other details involved in the acceptance of material for steam boiler construction. A committee of the Association of American Steel Manufacturers, comprising representatives of the Carnegie Steel Company, the Lukens Iron & Steel Company and the Worth Brothers Company, has drawn up some suggestions which seem to be meeting with the approval of shipbuilders, and now the plan is to secure a meeting with the Supervising Inspector General of the Board of Supervising Inspectors of the United States Steamboat and Inspection Service of the Department of Commerce to urge the modifications.

The argument is that the rules of the board when applied to marine boiler plates over 1⅝ in. in thickness do not lend themselves to workable conditions under best manufacturing practice, and while they can be met in cases of plates up to 1⅜ in. in thickness, they interpose difficulties which interfere with deliveries.

One change asked for is that the minimum elongation in 8 in., expressed in per cent, shall be equivalent to 1,400,000 divided by the tensile strength, with a deduction of ½ per cent from the specified percentage for each increase of ⅛ in. in thickness over ¾ in., to a minimum of 17 per cent. The manufacturers' association specification makes elongation per cent equivalent to 1,450,000 divided by the tensile strength and the minimum for the thicker plates 20 per cent.

Another suggestion is that definite requirements for the reduction of area should be eliminated, though results of this test may be recorded.

A third modification asked is that the tensile strength stamped on the plate shall be the minimum of the range specified on the order, rather than the actual for each plate. Such an arrangement, it is emphasized, would materially facilitate inspection and delivery of plates at the various manufacturing plants.

The American Drop Forge Association, whose membership includes many of the principal manufacturers of automobile forgings, will hold its annual convention June 9 and 10 in Philadelphia, Pa. Headquarters will be at the Adelphia Hotel. Business sessions will be held in the morning of both days, featured by addresses on the growth of forgings in the automobile industry. F. A. Ingalls, Harvey, Ill., is president, and E. B. Horne, Packard Motor Company, secretary. The chairman of the entertainment committee is H. N. Taylor, N. & G. Taylor Company.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

PROVING NEGLIGENCE IN PRACTICES OF EMPLOYER.—In an action for injury to an employee, evidence of customary methods in other like establishments may be offered by the employer to disprove negligence, but, as a rule, such evidence is not admissible to make out the employee's right to recover. This character of proof is admissible on behalf of an injured plaintiff only in exceptional instances, and when it tends to show that the customary method pursued by the defendant employer was not only unusual but more dangerous than the ordinary practice in other similar establishments. (Pennsylvania Supreme Court, Chambers vs. Mesta Machine Company, 97 Atlantic Reporter, 101.)

RUPTURE AS AN ACCIDENTAL INJURY UNDER COMPENSATION ACTS.—A rupture sustained by an employee through unusual strain in assisting in lifting heavy machinery is an "accidental injury" for which he is entitled to compensation under the Michigan workmen's compensation act, although unsoundness of the employee's body may have contributed to the rupture. (Michigan Supreme Court, Robbins vs. Original Gas Engine Company, 157 Northwestern Reporter, 437.)

EFFECT OF A PATENT.—The patent law is not the source of a patentee's right to fix the price of his patented article, nor of the right himself to make, use and vend the article; these are natural or inherent rights of the patentee. . . . The patent law is, however, the source of the patentee's right to exclude others, and so the entire or partial disposal of this right is involved in any transaction requiring payment of a license fee. This exclusive right is, of course, a franchise, possessing the qualities and characteristics of property during the life of the patent, and may be held and dealt with like any other kind of property belonging to the patentee. (United States Circuit Court of Appeals, Sixth Circuit, Swindell vs. Youngstown Sheet & Tube Company, 230 Federal Reporter, 438.)

APPLIANCES FOR UNLOADING HEAVY FREIGHT.—An employer is not to be charged with negligence, making him liable for injury to an employee, in the use of skids in unloading heavy freight, instead of adopting a crane or other similar appliance which would be safer, when it appears that skids are commonly used by employers for similar purposes and that they were reasonably safe for use in the particular instance. (Pennsylvania Supreme Court, Miller vs. Republic Chemical Company, 97 Atlantic Reporter, 73.)

CONTRIBUTORY NEGLIGENCE OF MACHINE OPERATOR.—The rule of law that an employee cannot recover damages for injury sustained through his doing work in an obviously dangerous manner applies to a case where an operator of a machine for punching holes in steel boxes placed his hand under the die, whereas the usual and safe way was to take hold of the side of the box, although the accident may have resulted directly from a defective condition of the machine whereby the upper die plate automatically descended. (Pennsylvania Supreme Court, Fritchle vs. Steel City Electric Company, 96 Atlantic Reporter, 1084.)

INJURY UNDER FALLING CRANE CARRIAGE.—In an action against a foundry owner for injury to an employee through fall of the carriage of a traveling crane which was being installed, the rules are applied that an employer owes a duty to employees to provide them with a reasonably safe place in which to work, and that although the employee assumed all risks naturally incident to the work of installation, done with due care, he did not assume perils resulting from any negligence in the way in which the work was carried on. (Kansas City Court of Appeals, Hayes vs. Berry, 184 Southwestern Reporter, 913.)

INJURY SUSTAINED OUTSIDE COURSE OF EMPLOYMENT.—A foundry molder was not injured in the course of his employment, and hence is not entitled to an allowance under the Michigan workmen's compensation act, where his hand was caught in gear wheels while he was descending from an electric crane after he had climbed it, in violation of general instructions, to point out to a machinist places which needed repairs. Having stepped outside the bounds of his duties as molder, he is not entitled to compensation for the injury, although he may have intended to benefit his employer in such voluntary service. (Michigan Supreme Court, Bischoff vs. American Car & Foundry Company, 157 Northwestern Reporter, 34.)

CONTRIBUTORY NEGLIGENCE IN OPERATING ELEVATOR.—Contributory negligence bars recovery for injury to an employee, caused by sudden starting of an elevator which he was attempting to dislodge, one of his feet resting on the floor of the building and the other on the floor of the elevator. (Pennsylvania Supreme Court, 96 Atlantic Reporter, 1033.)

Standard Screw Company's Increased Profits

One of the instances of profits tremendously increased by reason of the special nature of export business in the past two years is interestingly shown in the report of the Standard Screw Company. This report for the year ended March 31, 1916, shows net earnings, before deducting $2,000,000 for depreciation, of $4,163,738, against $277,336 the previous year. After deducting interest and preferred dividends, a balance was left applicable to dividends on the common stock of 78.02 per cent. Unfinished orders as of March 31 were nearly $5,000,000. The income account compares as follows:

	1916	1915	1914
†Net profits	$2,163,738	$277,336	$460,464
Interest charges	41,966	33,871	52,243
Surplus	$2,121,772	$193,465	$408,221
Dividends	546,289	240,959	232,500
Surplus	$1,575,483	*$47,494	$175,721

†Net income of companies owned after deductions, depreciation and expenses of the Standard Screw Company.
*Deficit.

Bureau of Standards Analyzed Samples

The U. S. Bureau of Standards, Washington, D. C., now has ready for distribution a new sample of its Iron D, No. 6-b, replacing No. 6-a, long out of stock. Its composition is: Carbon, 2.39; graphite, 1.79; silicon, 2.59; titanium, 0.077; phosphorus, 0.531; sulphur (grav.), 0.046; manganese, 1.54; copper, 0.044; chromium, 0.014; vanadium, 0.025, and nickel, 0.026 per cent. Until printed certificates can be had a provisional certificate of analysis, without details, will be furnished with each sample issued.

An antimony deposit in Sevier County, Arkansas, which is now being worked, having been made profitable by the European war, has been proved over an area about two miles wide by eight miles long, situated near Gillham. Five openings are being worked, with the deepest shaft down 225 ft. Most of the mining is being done under leases, but the ore is taken by the American Star Antimony Company, of which J. G. Battelle is president and C. M. Fenton treasurer, which is turning out about ten tons of metal per day. The same interests, which are connected with the Columbus Iron & Steel Company, Columbus, Ohio, are operating in southwest Missouri, near Webb City, in the zinc field.

The freight steamer William A. McGonagle, which is being built for the Pittsburgh Steamship Company, was launched at the Ecorse, Mich., shipyards of the Great Lakes Engineering Works May 20. The new vessel is named after the president of the Duluth, Missabe & Northern Railroad. It is 617 ft. long, will have a carrying capacity of about 12,500 tons of iron ore, and will be ready for commission about July 1.

The Modern Tool Company, Erie, Pa., announces that hereafter it will devote its entire time and efforts to its line of self-contained internal plain and universal grinding machines. It has sold its overhead countershaft line of plain, internal and universal grinders to Albert J. Ott, Chicago, Ill., who will manufacture and market these machines under the name of the Ott grinders.

DEALERS IN IRON AND STEEL

American Iron, Steel and Heavy Hardware Association at Pittsburgh

The seventh annual convention of the American Iron, Steel and Heavy Hardware Association began its sessions in the William Penn Hotel, Pittsburgh, Wednesday morning, May 24. Over 200 members and guests are in attendance from outside of Pittsburgh, while that city alone is represented by close to 100, making the meeting the largest ever held by this organization. A. H. Chamberlain, secretary, reports a large accession in membership since January 1, close to 100 concerns enrolling as new, active or associate members.

The convention was called to order by J. A. Gregg of Nicols, Dean & Gregg, St. Paul, Minn., who is president. Addresses of welcome were delivered by J. L. Haines, assistant to the president of the Jones & Laughlin Steel Company, by Robert Garland of the Garland Nut & Rivet Company, and by F. J. Lanahan of the Fort Pitt Malleable Iron Works. The response for the active members was made by E. J. McCarthy, of Beals & Co., Buffalo, and for the associate members by F. H. Payne of the Greenfield Tap & Die Corporation, Greenfield, Mass. J. A. Gregg, president, then made the annual address as follows:

RELATIONS OF JOBBERS AND MANUFACTURERS

President Gregg, referring in his address to the remarkable change in business conditions since the last convention, said:

From the deepest, darkest depression, and almost from the depths of despair, we have climbed to heights not dreamed of. From mills and factories running 25 to 50 per cent of capacity, we have gone to full capacity and double turn. From a buyer's market, in which no reasonable offer was turned down (and many unreasonable ones accepted to keep the plant running and give the employees work) we have the transition to a seller's market, where deliveries are the first consideration and price secondary; where we have taken out all our contracts and sighed because they were not twice as large.

The advance in price has been from 50 to 150 per cent in many lines. Our country is very prosperous and we are surely on a high level. The question is, how long can we maintain it? Wages have advanced, and rightfully so, as all living expenses are up on a higher plane than ever before. Our whole people are more extravagant. The hard thing for every one is to come down. Come down we must, but when? Ah! there is the rub. But let me make a prediction. You will have to make enough in one or two fat years to last you several very lean years. * * *

The relations between the jobbers and the manufacturers are and have been with few exceptions very cordial and there is very little friction. The warehouses of the Steel Corporation in the East have maintained a fair differential between mill and warehouse prices and have also allowed a fair margin for the jobber out of warehouse. In the West, we do not get the same treatment. This you will realize when I tell you that St. Paul and Minneapolis are the lowest steel markets in the United States today. These warehouses have come to stay, but they should not be a menace to existing jobbers.

President Gregg referred to the value of associations in preventing trade abuses—the returning of goods without authority, the unfair deduction, the undue extension of credit, and many more—but without in any way acting in restraint of trade. He reiterated the association's advocacy of one-cent postage and the Stevens bill permitting fixing of resale prices, paid his respects to the parcel post and concluded by advocating industrial and military preparedness, the latter to include a year's compulsory training for young men. As an added feature of the *Bulletin*, the association's monthly publication, the president recommended market reports on 10 or 15 staple articles from a number of trade centers.

Imports of finished iron and steel into British India in 1915 were only 298,042 gross tons as compared with 465,498 tons in 1914. The largest items were 50,218 tons of galvanized sheets in 1915 and 129,622 tons in 1914.

International Harvester Announces Changes

A number of changes in the organization of the International Harvester Company of New Jersey and the International Harvester Corporation, affecting men prominently connected with their affairs, have recently been announced. Harold F. McCormick having resigned the position of treasurer of the company, as well as of the corporation, the directors elected George A. Ranney to the position of treasurer of both companies. Mr. Ranney will retain, also, the position of secretary, which he has held since May 16, 1913. This resignation will not in the least diminish the active participaton which Mr. McCormick as vice-president has always taken in the management of the company's affairs.

H. F. Perkins, division manager and president of the Wisconsin Steel Company, will have general supervision over the manufacturing departments and the raw material properties, and is relieved of supervision of the purchasing department.

A. E. McKinstry is appointed division manager, with general supervision over the purchasing, experimental, patent and traffic departments.

R. C. Haskins retires from the position of division manager of sales and will assume other duties with the companies.

W. V. Couchman is appointed division manager of sales, with general supervision over the domestic sales, foreign sales, Canadian sales, collection, and advertising departments. B. A. Kennedy, division manager of manufacturing, retired from active service.

H. B. Utley, formerly head of the purchasing department, has been promoted to executive assistant. W. B. Edgar, formerly Mr. Utley's assistant, has been made manager of the purchasing department and J. B. Pauley, who has returned from the foreign organization, has been appointed assistant manager of the purchasing department. Frank Culbertson, formerly assistant sales manager, has been promoted to the position of manager of domestic sales. A. L. Upton, formerly Eastern district manager, succeeded to Mr. Culbertson's former place, and W. P. Wells, formerly manager for the International Harvester Company of Canada, Ltd., of the Regina (Saskatchewan) branch, became Eastern district manager to succeed Mr. Upton.

New Aeroplane Company for Buffalo

The Engle Aeroplane & Motor Company, Buffalo, N. Y., has filed incorporation papers with a capitalization of $750,000, and will manufacture aeroplanes and hydroplanes. Albert J. Engle, now with the Curtiss Aeroplane Company, will head the manufacturing organization of the new company, which will build its own motors of 8 and 12 cylinder, air-cooled type, similar to the French Renault aeroplane motors. It will turn out powerful and speedy flying boats of the latest design and aeroplanes for sport, pleasure and business purposes.

The new company has absorbed the Coombs Aeroplane Company and taken over its large plant at Depew, N. Y., a manufacturing suburb of Buffalo. Machinery for the manufacture of motors will be installed. There will be an aviation field adjacent to the Depew plant and the company will have a hangar on Buffalo harbor for the testing of hydroplanes and for the use of its hydroplane school. The executive offices of the company will be located at 909 and 910 D. S. Morgan Building, Buffalo. Albert J. Engle, Orson J. Weimert and Max Mauran are the incorporators of the company.

The plant of the Dayton Coal & Iron Company, Dayton, Tenn., will not be put in operation under the direction of the bankruptcy court, according to a decision reached at Chattanooga, Tenn., but, instead, will be sold at the courthouse door in Dayton, June 15, at 1 P. M. This is the order of James H. Anderson, referee, which is not in accord with the recommendations of the creditors' committee that the plant should be put in operation. The referee held that courts were not expected to go into business, and observed that trustee operations rarely prove successful.

Pennsylvania Steel Company Sale Stands

Judge Rellstab, in the United States District Court at Newark, N. J., May 22, granted a temporary injunction restraining the sale of the Pennsylvania Steel Company to the Bethlehem Steel Corporation. The case was a continuation of an action brought by Joseph H. Brandt of Philadelphia, owner of 139 shares of preferred stock, and Clarence H. Venner of New York City, who appeared as the owner of 24 shares of the common.

Mr. Brandt's attorney, Louis E. Stern of Atlantic City, asked to withdraw an application for a permanent injunction, but Mr. Venner persisted on the ground that the sale was not a legitimate transaction and was intended to avoid provisions of the New Jersey laws governing corporations.

On the following day, at the close of the argument on Mr. Venner's application Judge Rellstab delivered an oral opinion ruling against him, expressing the court's belief that the Clayton act did not apply and that upon the papers before the court no violation of the Sherman law was shown. He held that under the laws of New Jersey more than two-thirds of the stockholders of a corporation, acting in good faith, were entitled to dissolve the corporation and bring about a sale of its property, even against the will of minority stockholders. He said that his only doubt was as to the provision in the proposed agreement of sale by which the purchase price was to be paid in bonds and not in cash. He ruled that this point was covered by the offer of counsel for the Pennsylvania Steel Company to pay into court such amount as would be required to protect Mr. Venner in respect of the twenty-four shares of common stock which he held.

Mr. Venner's counsel announced that he would take an appeal to the Circuit Court of Appeals.

Pulaski Iron Company to Erect New Stack

The blast furnace of the Pulaski Iron Company, Pulaski City, Va., went out of blast May 19 after running continuously since October 22, 1913, having made a record run with regard to production. It once ran for a longer period, but did not make as much iron as in the last run. The stack, which was built in 1887, and blown in the following year, will be dismantled and replaced by a new one with all modern improvements. It is expected that the capacity of the new furnace will be about 30 per cent greater than that of the old one, which made about 200 tons a day. The new equipment will include storage bins, a skip hoist and two turbo-blowers, one to be furnished by the General Electric Company and one by the Ingersoll-Rand Company. The work will be done by Arthur G. McKee & Co., Cleveland, Ohio, and will be completed in four to five months.

Woodstock Blast Furnace to Operate

One of the two Woodstock blast furnaces at Anniston, Ala., is being repaired by the owners, and when the work is completed it will be operated by the Woodstock Operating Corporation, to which it has been leased. The product will be the Woodstock brand of foundry iron made from native brown ores, the same grade of iron which has come from these furnaces for a number of years. The furnace will be blown in about July 1. Its last operation was in 1911 by the Anniston Iron Corporation as lessee from M. H. Maury and J. B. Carrington, receivers. Crocker Brothers, New York, are to be sales agents.

German Steel Shipments Increasing

Shipments of the German Steel Works Union in March, 1916, were 310,646 metric tons, against 282,269 tons in February and 285,784 tons in January. The March shipments make the third largest month since the war started, the record month being March, 1915, with 351,560 tons, and they exceed the monthly average for 1915 by 40,136 tons. They were made up as follows: Semi-finished steel, 82,787 tons; railroad material, 153,994 tons, and shapes, 74,865 tons.

NEW EASTERN PLATE MILL

Worth Brothers Negotiating for a Steel Works Site Near Chester, Pa.

Recent negotiations for land in the vicinity of Chester, Pa., and for a blast-furnace and coke-oven plant indicate the re-entry of William P. Worth and J. Sharpless Worth into the steel industry as manufacturers of plates. As Worth Brothers Company they sold their blast furnaces, steel works and plate-rolling mills at Coatesville, Pa., some months ago to the Midvale Steel & Ordnance Company for about $18,000,000. Definite announcement concerning the new project has not been made, but it is known that Norman R. Entrekin, who was superintendent of the Worth plant at Coatesville, has resigned as general superintendent of the Midvale operations at Coatesville to become general superintendent of a Worth steel plant to be erected in the Chester district. Options have been taken on several tracts of land on the Delaware River, and it is considered probable that the Chester tract will be acquired in view of its proximity to the blast furnace of the Delaware River Steel Company. No announcement has been made as yet of the acquisition of this furnace by the Worth interests. Connected with it are 40 Semet-Solvay by-product coke ovens with an annual capacity of 95,000 net tons. The furnace is 70 x 17 ft. and its annual capacity is 70,000 tons.

The construction of open-hearth furnaces and plate mills will require the greater part of a year, and the rounding out of the plans now understood to be in contemplation will involve an outlay of several million dollars.

Ohio Seamless Tube Company to Expand

The Ohio Seamless Tube Company, Shelby, Ohio, has purchased a building site and has started the erection of an entirely new plant in addition to its present plant for the manufacture of seamless cold drawn and hot finished tubes. The new mill will have a capacity of 2000 tons per month and will be equipped especially for handling alloy steels and all high grades of steel entering into the uses of high grade seamless tubing. It is expected to be in operation by Dec. 1. The combined capacity of all of the mills of the company, when completed, will be 4000 tons per month.

The Ohio Seamless Tube Company has found it necessary to build this additional mill to take care of the increased demands from its present customers. When the new equipment is in operation the company will have a capacity of 2000 tons per month on high grade materials for ball and roll bearings. It was the first American manufacturer to produce high carbon high chrome seamless tubing for ball bearing purposes, and after the breaking out of the European war, which checked the importing of this material, the company built equipment and has had in operation for the last several months an entirely new plant for taking care of this class of business. It is stated that after the mill is completed the company's capacity will be sufficient to take care of the entire demands of the bearing trade.

Pipe Fittings Wanted for Panama Canal

Sealed proposals will be received by the assistant purchasing agent of the Panama Canal, 24 State Street, New York, not later than 2 p. m., June 1, for the purchase of a very large quantity of pipe fittings, comprising return bends, crosses, elbows, ball joints, reducers, strainers, tees and unions. Specifications can be secured from the office above named and samples are to be seen there.

The electric refining of zinc in Norway is stated by the British minister at Christiania to have been developing at Trollhattan for some years and the output is now about 6000 tons per year.

Iron and Steel Markets

LARGEST WAR STEEL SALE

Shell Forgings and Plates Most Active

Otherwise New Buying Is Less—Only Advances Are in Bolts and Rivets

In the general tendency of the domestic market to less activity, the heavy demand for war steel and for plates becomes highly interesting. The Steel Corporation has taken on the largest single contract for shell forgings yet let by the British Government, from 200,000 to 250,000 tons being involved. Adding about 100,000 tons for gun forgings closed by a Shenango Valley company and a like amount placed two weeks ago in eastern Pennsylvania, puts the total above 400,000 tons. Present inquiries on behalf of the Allies represent nearly 200,000 tons more.

The plate market has divided attention with war blooms in view of the appearance of inquiries for 1000 locomotives for export, chiefly to Russia, and the new evidence of the enormous tonnage of steel yet to be bought for shipbuilding programs already made. For 600 of the locomotives the Russian inquiry is urgent. In the new ship-plate requirements Pacific coast yards figure largely.

An interesting development in eastern Pennsylvania are the plans of a retired plate firm to build a new mill and reenter that field.

Along with the sensational activity in shell steel there is just now a sharper competition for forging and machining work. A good many munitions plants have lately named prices well below those at which expiring contracts were taken.

Cases are cropping up also of very close figuring on fabricating contracts, some recent bids indicating a basis of 2.35c. to 2.40c. on structural shapes. The call for steel for new manufacturing plants and enlargements has evidently passed the high point.

The trade is checking itself against too broad a conclusion from recent easing in prices of soft open-hearth steel. Billets and sheet bars can be had here and there on shorter deliveries than were possible a month ago, and $42 Pittsburgh can be done, but the larger companies are not making concessions. On some products they are sold not only for this year but well into the first quarter of 1917.

On the other hand are instances of specifications falling off because consumers earlier in the year crowded upon the mills more than their current needs, to insure against shortage.

Implement makers are now actively in the market for bars for the first half of 1917. Some sales have been made at 2.35c., Pittsburgh.

Export tin-plates have sold at $6 a box and higher to the Orient. Japan is still urgently seeking plates here and is trying to get 12,000 tons of wire rods, but so far without success.

Sheets are not as firm as the heavier steel products. Mills whose sole product is sheets are cutting more than those which have other outlets for their steel. On light weight black sheets in roofing sizes some of the cuts have been deep.

Bolts and nuts are 5 per cent higher and rivets $5 a ton, these being practically all the advances of the week. In all lines there is less buying at premium prices for prompt shipment.

The railroad attitude toward high car prices is unchanged. Locomotive needs, however, are more imperative and orders are not stopped by the advance to $45,000 from $27,000 for similar types last year.

Apart from a spurt in steel-making iron, with sales of about 45,000 tons at Pittsburgh and Youngstown, the pig-iron market has been drifting. Basic iron for third quarter sold at $18 at Valley furnace and Bessemer iron at $20.50, one steel company taking 15,000 tons of each.

Foundry strikes, now extending to the Chicago district, have reduced foundry iron shipments somewhat and prices are off 25 to 50 cents from the top. Southern iron has sold at $15 Birmingham for the first half of 1917 and one Westinghouse purchase of Southern No. 2 foundry was at $14.75 for the last quarter of this year.

Pittsburgh

PITTSBURGH, PA., May 23, 1916.

A rise of 5 to 10 per cent on nuts and bolts and $5 per ton on rivets are the only advances the past week. The coming of warm weather is already having the effect of increasing the shortage in supply of labor, and to some extent also it is cutting down output, so that the mills are not making as good deliveries as they were a month or two ago, and their condition is likely to get worse instead of better. The demands for deliveries of material are as insistent as at any time. One consumer who uses ordinarily 3000 tons of steel per month received in April only 131 tons, in spite of the fact that the mill is doing the best it can to serve its customers. Pig iron has been more active, but semi-finished steel is quiet with prices not so strong, due to larger supply. The new demand for tin plate continues enormously heavy, and export sales are said to have been made at $6 and higher. The demand for other finished iron and steel products is quiet, consumers not placing any orders they can avoid, but this is not worrying the mills, as their present obligations will take their output over the remainder of the year, and with one or two of the larger steel companies well through the first quarter of 1917. Coke and scrap continue dull and prices are

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	May 24, 1916.	May 17, 1916.	Apr. 26, 1916.	May 26, 1915.
No. 2 X, Philadelphia....	$20.50	$20.50	$20.50	$14.25
No. 2, Valley furnace....	18.00	18.00	18.50	12.75
No. 2 Southern, Cin'ti...	17.90	17.90	17.90	12.40
No. 2, Birmingham, Ala.	15.00	15.00	15.00	9.50
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.00
Basic, del'd, eastern Pa..	20.50	20.50	20.50	13.25
Basic, Valley furnace....	18.00	18.00	18.00	12.50
Bessemer, Pittsburgh....	21.95	21.95	21.95	14.70
Malleable Bess., Ch'go*..	19.50	19.50	19.50	13.00
Gray forge, Pittsburgh..	18.70	18.70	18.70	13.45
L. S. charcoal, Chicago.	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh.	45.00	45.00	45.00	20.00
O.-h. billets, Pittsburgh.	*42.00*	43.00	45.00	20.00
O.-h. sheet bars, P'gh..	*42.00*	43.00	45.00	21.00
Forging billets, base, P'gh	69.00	69.00	68.50	26.00
O.-h. billets, Phila.....	50.00	50.00	50.00	22.02
Wire rods, Pittsburgh....	60.00	60.00	60.00	25.00
Finished Iron and Steel,				
Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.25	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.34	1.34
Iron bars, Philadelphia..	2.659	2.659	2.659	1.17½
Iron bars, Pittsburgh....	2.60	2.60	2.50	1.20
Iron bars, Chicago.....	2.35	2.35	2.35	1.15
Steel bars, Pittsburgh...	3.00	3.00	3.00	1.20
Steel bars, New York...	3.169	3.169	3.169	1.369
Tank plates, Pittsburgh.	3.75	3.75	3.75	1.15
Tank plates, New York.	3.919	3.919	3.919	1.319
Beams, etc., Pittsburgh..	2.60	2.60	2.60	1.20
Beams, etc., New York..	2.769	2.769	2.769	1.369
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.15
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.20
Steel hoops, Pittsburgh..	*2.75*	3.00	3.00	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	May 24, 1916.	May 17, 1916.	Apr. 26, 1916.	May 26, 1915.
Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	2.90	2.90	2.85	1.75
Galv. sheets, No. 28, P'gh	*4.75*	5.00	5.00	3.75
Wire nails, Pittsburgh...	2.50	2.50	2.40	1.55
Cut nails, Pittsburgh....	2.60	2.60	2.60	1.55
Fence wire, base, P'gh..	2.45	2.45	2.25	1.35
Barb wire, galv., P'gh...	3.35	3.35	3.25	2.10
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	18.00	18.00	18.00	12.25
Iron rails, Philadelphia..	20.00	20.00	20.00	15.00
Carwheels, Chicago.....	13.00	13.00	13.50	9.75
Carwheels, Philadelphia..	16.50	16.50	17.00	11.50
Heavy steel scrap, P'gh.	*16.75*	17.00	17.25	11.75
Heavy steel scrap, Phila.	*16.00*	16.50	17.50	11.00
Heavy steel scrap, Ch'go	*15.75*	16.00	16.50	9.50
No. 1 cast, Pittsburgh..	*16.00*	16.25	16.25	12.00
No. 1 cast, Philadelphia.	17.50	17.50	17.50	12.25
No. 1 cast, Ch'go (net ton)	12.50	12.50	12.75	9.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt...	$2.25	$2.25	$2.00	$1.50
Furnace coke, future....	2.50	2.50	2.40	1.65
Foundry coke, prompt...	3.00	3.00	3.25	2.00
Foundry coke, future....	3.25	3.25	3.25	2.15
Metals,				
Per Lb. to Large Buyers	Cents.	Cents.	Cents.	Cents.
Lake copper, New York..	29.00	29.00	28.75	21.00
Electrolytic copper, N. Y.	*28.50*	28.62½	28.50	18.50
Spelter, St. Louis.....	*14.75*	15.25	18.00	18.75
Spelter, New York.....	*15.00*	15.50	18.25	19.00
Lead, St. Louis.....	*7.25*	7.40	7.37½	4.22½
Lead, New York.....	*7.45*	7.50	7.50	4.30
Tin, New York.....	*48.00*	49.25	49.75	37.87½
Antimony, Asiatic	*28.00*	33.00	39.50	35.00
Tin plate, 100-lb. box, P'gh	$5.50	$5.50	$4.50	$3.15

weak. Labor troubles in the Pittsburgh district are pretty well over, and it is believed the machinists' and molders' strikes will be settled within a short time.

Pig Iron.—There is more activity in Bessemer and basic pig iron than for some time. The Republic Iron & Steel Company has bought, for third quarter delivery, 15,000 tons of basic iron at $18, Valley furnace, and 15,000 tons of Bessemer at $20.50, Valley furnace. The latter iron was sold by a Cleveland interest which has a freight rate of 42c. from the Shenango Valley to Youngstown, thus making the delivered price $20.92. A prominent steel foundry has since bought 5000 tons of Bessemer iron for delivery over last half of the year at $21 at furnace, and there have also been sales of 3000 to 4000 tons of Bessemer for export at $21, Valley. It is not believed any more Bessemer iron could be picked up at less than $21. The Westinghouse Electric & Mfg. Company has bought 1000 tons of Northern No. 2 foundry iron at the equivalent of $18, Valley furnace, and about 4000 tons of Southern No. 2 below $14.75, Birmingham, all for its Cleveland works. Very little is doing in foundry, and prices are not very firm. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; malleable Bessemer, $18.50 to $19, and No. 2 foundry, $18 to $18.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh and Cleveland districts being 95c. per ton. We note sales of 2000 to 3000 tons of No. 2 foundry iron, which has a very high reputation for quality in the trade, at $18.50, Valley furnace, some sellers absolutely refusing to shade that price.

Billets and Sheet Bars.—The freer offerings of open-hearth billets and sheet bars referred to in this report last week continue, and sales of both billets and sheet bars have been made on the basis of about $42, Pittsburgh, and possibly lower. On the other hand, some of the steel mills would not sell Bessemer or open-hearth billets at less than $45, and are not anxious to sell even at that price. Deliveries from the mills of both Bessemer and open-hearth steel are more prompt, and there is not nearly so much complaint from consumers on this score. A sale of 1500 tons of open-hearth sheet bars for delivery over the next three or four months is reported to have been made to a local sheet mill at about $42, delivered, the bars coming from an outside district. The output of Bessemer and open-hearth ingots in the Pittsburgh district for May is expected to break all previous records for any one month. We quote soft open-hearth billets and sheet bars at $42 to $43; Bessemer billets, $45; Bessemer sheet bars, $45, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Ferroalloys.—The new inquiry for ferromanganese has quieted down, consumers evidently being fairly well covered for some time ahead. An occasional carload of 80 per cent domestic is being sold at $325 to $350 per ton at furnace. The supply of spiegeleisen is still very short, and 20 to 30 per cent is held at $70 to $75 per ton, delivered. The supply of ferrosilicon seems to be a little better, and consumers are getting more prompt deliveries than for some time. We quote 80 per cent domestic ferromanganese at $325 to $350 per gross ton at furnace, freight added to point of delivery. We quote 50 per cent ferrosilicon at $85 for lots up to 100 tons, over 100 tons and up to 600 tons, $84, and over 600 tons, $83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are now quoted as follows: 9 per cent, $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. Seven per cent silvery for the same delivery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. All these prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of $2 per gross ton to Pittsburgh.

Steel Rails.—No new orders are being placed for standard sections. In fact, the railroads are not only not buying rails but are not placing orders for other track materials. The new demand for light rails continues active, the Carnegie Steel Company receiving new orders and specifications each week for 4000 to 5000 tons or more. We quote light rails as follows: 25 to 45 lb. sections, 2.10c.; 16 and 20 lb., 2.15c.; 12 and 14 lb.,

2.20c., and 8 and 10 lb., 2.25c., in carloads and up to 100 tons. An advance of 5c. per 100 lb. is charged for less than carloads and down to 3 tons, while under 3 tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.47½c., and open-hearth steel, 1.56½c., Pittsburgh.

Structural Material.—New inquiry is heavy, but local fabricators are not bidding actively on new work as they are practically filled up for the remainder of this year. The McClintic-Marshall Company has taken a bridge for the Central Railroad of New Jersey, 350 tons, and the Jones & Laughlin Steel Company 3000 tons for additions to the plant of the Revere Sugar Refining Company, Boston, Mass. Mills are still far back in deliveries and on new orders are not promising shipments inside of five to six months. We quote beams and channels up to 15 in. at 2.60c. to 2.75c. at mill, for delivery in third and fourth quarters of this year. Small lots for prompt delivery from warehouse stocks are held at about 3.25c. to 3.50c. and higher.

Plates.—No new orders for steel cars have been placed the past week and no important inquiries are in the market. The railroads seem determined not to pay the high prices for steel cars now quoted by the builders. Several local mills are in position to make deliveries on plates in six to eight weeks, and on such business they are able to get 3.50c. to 4c. at mill. We quote ¼-in. and heavier plates for delivery at convenience of the mill, which would mean probably last quarter, at 2.75c. to 2.90c., while for shipment in two to three months 3.50c. to 4c. and higher are quoted.

Sheets.—New buying of sheets is not very active for the reason that most consumers are covered for practically the remainder of the year. Specifications against contracts are very heavy. Last week the American Sheet & Tin Plate Company received more specifications against contracts for sheet and tin mill products than in any previous week in its history except one. The new demand for galvanized sheets is quiet, and owing to the anxiety of some of the mills to sell, prices are slightly lower, No. 28 galvanized, made of Bessemer stock, being offered at about 4.75c., and open-hearth about 4.85c. On blue annealed sheets 3c. is absolute minimum, some mills holding at 3.25c. and higher. We quote No. 28 Bessemer black sheets at 2.90c. to 3c., and open-hearth, 3c. to 3.10c.; No. 28 galvanized Bessemer stock, 4.75c. to 4.85c., and open-hearth 4.90c. to 5c. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., 2.70c.; Nos. 25, 26 and 27, 2.75c.; No. 28, 2.85c.; No. 29, 2.95c., and No. 30, 3c. These prices are for carload and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—This material is in very active demand, export inquiry being heavy. Several of the larger makers are not quoting on export inquiries, having their entire output sold for the remainder of the year. Several sales of export tin plate, ranging from 5000 to 10,000 boxes, have been made at about $6 at mill. It is said there is no trouble in getting $6 or better per base box for tin plate on export orders if the mill could make the deliveries wanted. It is expected that the domestic market will reach $6 within a short time.

Cold-Rolled Strip Steel.—More contracts are being made with regular customers for third quarter delivery, and we note one of 300 tons and another of 200 tons for last half of the year at $6 per 100 lb., while small orders for shipment at convenience of the mill are being placed at prices ranging from $6.50 to $7. Several mills report they have taken fairly large contracts for delivery in last quarter of this year and first quarter of 1917 at $6.25, and that these contracts contain no cancellation clauses. Most of the makers have their output sold up for four to five months. Extras, standard with all the mills, were printed in full on page 810 of THE IRON AGE, March 30.

Skelp.—Mills are filled for four or five months ahead and are not taking new orders. Prices are purely nominal, and a mill that could make delivery in six to eight weeks could readily get premiums. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Railroad Spikes.—It is said that inquiries are in the market for 50,000 to 75,000 kegs of spikes for 1917 delivery, but the railroads are very slow in closing on account of the high prices now quoted. Specifications against contracts placed some time ago are coming in at a fair rate. We quote:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—Effective Friday, May 19, prices on nuts and bolts were again advanced about 5 per cent, due, the makers state, to the continued heavy demand and also to the higher prices for steel. Makers of nuts and bolts say they are not catching up on deliveries to any extent, their output being restricted on account of slow deliveries of steel from the mills. Discounts in effect from May 19, which the makers state are for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h.p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c.p.c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5.

Blank bolts, 40 and 10 per cent; bolt ends, with h.p. nuts, 40 and 10; with c.p. nuts, 35 and 5. Rough stud bolts, 15. Lag screws (cone or gimlet point), 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cut and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h.p. sq., tapped or blank, $2.90 off list; hex., $2.90 off; c.p.c. and t. sq. tapped or blank, $2.60 off; hex., $3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Rivets.—Effective Friday, May 19, prices on rivets were again advanced $5 per ton. Makers report the demand as very heavy. Some large export shipments have recently been made from this district. We quote buttonhead structural rivets, ½ in. in diameter and larger, at $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f. o. b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Shafting.—Some fairly large contracts for shafting for delivery in third quarter and also over the last half of this year have been made at 15 per cent off list. On small orders for fairly prompt shipment very close to base is being paid. Specifications against contracts are heavy, especially from the automobile and screw stock trades. We quote cold-rolled shafting at 15 per cent off in carload lots for delivery in third and fourth quarters, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Wire Rods.—The Pittsburgh Foreign Trade Commission reports an inquiry from Japan for 12,000 tons of either Bessemer or open-hearth rods. It is not believed that any part of this order, if it is placed, will be given to local mills, as they have their output sold up for the next four or five months. Two local concerns that are delivering rods in Canada on old contracts are making a declared value of $60 per ton. We therefore quote Bessemer, open-hearth and chain rods at $60 per ton, f.o.b. Pittsburgh.

Wire Products.—New demand for wire and wire nails is reported by the mills to be heavy, and specifications against contracts are very active. While the nominal price of nails is $2.50 base per keg, several makers are quoting $2.60 for delivery in two to three months, and one mill is quoting $2.70 for delivery in last quarter. There is a heavy export demand for barb wire, but local mills are not quoting on these inquiries, as their output is pretty well sold for the next three or four months. Mills that are in a position to make deliveries of wire nails in four to six weeks readily obtain $2.60 per keg. Regular prices in effect from May 1 are as follows: Wire nails, $2.50 to $2.60 per keg; galvanized, 1 in. and longer, taking an advance over this price

of $2, and shorter than 1 in., $2.50. Plain annealed wire, $2.45 per 100 lb.; galvanized wire, $3.15; galvanized barb wire and fence staples, $3.35; painted barb wire, $2.65; polished fence staples, $2.65; cement coated nails, $2.50, base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—Very large contracts for shell forgings have been placed with a local maker for delivery over the remainder of the year. The new demand for iron and steel bars is heavy, and the implement makers are now actively in the market for their requirements of steel bars for the first half of 1917. It is said that several contracts have lately been placed for steel bars for first half delivery at 2.35c. at mill. The new demand for iron bars is very active and mills are filled up for several months. Quite heavy advances in wage scales for bar-iron mills that sign the Amalgamated scale are asked in the new scale to become effective July 1, but it is believed a settlement will be reached without any trouble. All the iron and steel bar mills are back in deliveries six to eight weeks or longer. We quote steel bars at 2.75c. to 2.90c. for delivery at convenience of the mill, which would not be before last quarter. Small lots for fairly prompt shipment bring as high as 3.25c. at mill. We quote refined iron bars at 2.60c. to 2.75c.; railroad test bars, 2.70c. to 2.80c. at mill. These prices are for delivery at convenience of the mill, and for fairly prompt shipment premiums would be paid.

Hoops and Bands.—For delivery at convenience of the mill bands are quoted at 2.75c., and for fairly prompt shipment at 3c. Mills report they are filled up for the next four or five months, and one leading maker states it has its output of hoops and bands sold up for the remainder of this year. We quote hoops and bands at 2.75c. to 3c. at mill, prices depending on deliveries wanted.

Merchant Steel.—Mills report their product sold for the remainder of this year and prices quoted on new inquiries are largely nominal and for delivery at convenience of the mill, which would be in five or six months or longer. On small lots, for indefinite delivery, prices are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.35c., base; under ½ x 1½ in., 2.50c.; planished tire, 2.55c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Cotton Ties.—As yet no price has been fixed on cotton ties for this season, but this will likely be done early in June. Makers have been rolling cotton ties for some time, as they could spare the steel, and will have accumulated fairly large stocks when the season opens. A price of $1.25 per bundle of 45-lb. has been talked of.

Wrought Pipe.—The new demand for merchant iron and steel pipe continues heavy, and mills have their output well sold up to August or later. Some inquiries are in the market for large gas and oil lines, mostly for the Oklahoma and Texas districts, but the best delivery the mills can make on these is September or later. Discounts on black and galvanized iron and steel pipe, as given on another page, are very firm. An advance in prices is looked for at an early date.

Boiler Tubes.—The new demand is only fairly heavy, due to the fact that nearly all consumers are covered through second and third quarters, and some of the larger consumers through practically the remainder of the year. The output of iron and steel boiler tubes at present is much the heaviest ever known, and shipments are also breaking records, but the mills are still far back in deliveries. Discounts now in effect are given on another page, but an advance in prices is looked for soon.

Old Material.—The local scrap market is absolutely stagnant, dealers not trying to make sales and consumers not buying and not interested in the market. Prices on nearly all grades of scrap used for making steel are 25c. to 50c. per ton lower, but, at the same time, there is not a great deal of scrap pressing on the market. It is believed that stocks held by several of the largest consumers are pretty low, and that they will be in the market again in the near future. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.75 to $17.00
No. 1 foundry cast	16.00 to 16.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	17.00 to 17.25
Hydraulic compressed sheet scrap	15.00 to 15.25
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	13.25 to 13.50
Bundled sheet stamping scrap	12.75 to 13.00
No. 1 railroad malleable stock	15.25 to 15.50
Railroad grate bars	12.25 to 12.50
Low phosphorus melting stock	19.50 to 20.00
Iron car axles	25.00 to 25.50
Steel car axles	25.00 to 25.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	15.00 to 15.25
Machine-shop turnings	9.75 to 10.00
Old carwheels	14.50 to 15.00
Cast-iron borings	9.75 to 10.00
*Sheet bar crop ends	17.50 to 17.75
No. 1 railroad wrought scrap	19.00 to 19.50
Heavy steel axle turnings	13.00 to 13.50
Heavy breakable cast scrap	14.00 to 14.50

*Shipping point.

Coke.—There is nothing doing in the local market. A serious shortage in labor in the coke region is developing, and this will likely get worse, so that the output in the summer months is likely to show a falling off. The recent advance in wages has materially increased the cost of making coke. We quote best grades of furnace coke for prompt shipment at $2.25 to $2.35 per net ton at oven, but some makes are offered at $2. On contracts for last half of the year, from $2.50 to $2.75 per net ton at oven is talked of, but nothing is being done. Two leading makers of furnace coke that has a very high reputation in the trade for quality are holding at $3 per net ton at oven. Furnaces say they will not pay above $2.50 for furnace coke for last half of the year, and producers claim this price is too low in view of the higher cost of making coke. We quote best grades of foundry coke for spot shipment at $2.75 to $3, and on contracts $3.25 to $3.50 per net ton at oven. The Connellsville *Courier* gives the output of coke in the Connellsville region for the week ended May 13 as 440,678 net tons, an increase over the previous week of 29,478 tons.

Chicago

CHICAGO, ILL., May 23, 1916.—(*By Wire.*)

The disposition to find in the few instances of somewhat easier prices a general condition is making itself apparent, but this is largely anticipation outrunning the facts. There is less of buying for prompt shipment at premium prices, but this activity is lessened as much by the difficulty of securing material as lack of demand. With respect to structural steel there is likewise some relief and the situation is easier with respect to both black and galvanized sheets, but prices as high as 4.20c., Pittsburgh, are reported paid for plates for early delivery and some of the mills that are about to open their books for last half contracts are asking 3.60c. to 3.75c. An advance of 5 per cent in the price of bolts is also announced. For wire, an advance of $2 per ton over the market is still being secured by some of the independent interests. New projects involving steel in any quantity are not appearing and sales, in consequence, show a considerable falling off, although in the case of the rail mills the formal closing of contracts previously arranged for continues to swell sales figures. Prices have been quoted on 38,000 tons of Bessemer rails for Italy. The extent to which contract schedules have been anticipated is resulting in a falling off in specifications at this time. The closing of implement contracts for first half steel is imminent, and

there has yet appeared no indication that these contracts will be closed at any concession from prevailing quotations. In the pig-iron market there is very little activity, and such inquiry as has appeared is exceedingly slow in closing. Inquiry for some 20,000 tons of basic is noted. Both the pig-ron and scrap markets present indications of weakness, particularly pronounced in the case of old material.

Pig Iron.—Labor difficulties, which have included strikes at the foundries of the International Harvester Company, Illinois Malleable Iron Company, Chicago Malleable Castings Company and Western Foundry Company, as well as a general shortage of men, have had their effect, and in numerous instances shipments of iron from the furnaces have been held up. As an offset, some consumers have been willing to have their shipments advanced, but the net of the situation is a retarded movement. The negative aspects of the market are also enhanced by the relatively few sales and lack of inquiry. The most prominent transaction of the week was the purchase of 2000 tons of Nos. 2 and 3 Southern iron by a local stove manufacturer. The buyer also inquired for 1000 tons of Northern iron. The American Steel Foundries is inquiring for basic for all of its plants, although its formal inquiry is reported as covering but 5000 tons. For Northern iron prices are being maintained without exception, but for iron from the South $15, Birmingham, can be readily done on any desirable lot. For spot iron, in carload lots, $15.50 has been paid locally. It is the expectation that the exercising of the option to purchase the Iroquois Iron Company, scheduled for the last week of this month, will markedly strengthen the Northern iron furnace position through the elimination of some competitive activity. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.50
Northern coke foundry, No. 2	19.00
Northern coke foundry, No. 3	18.50
Southern coke, No. 1 f'dry and 1 soft	$19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft	19.00 to 19.50
Malleable Bessemer	19.50
Basic	19.00 to 19.50
Low phosphorus	34.00 to 36.00
Silvery, 8 per cent	31.50
Bessemer ferrosilicon, 10 per cent	35.50

(By Mail)

Rails and Track Supplies.—The closing up of some of the contracts for rails, negotiated prior to May 1, compasses practically the entire activity in this direction aside from a few sales of minor quantities. Quotations have been made on an inquiry from Italy for 38,000 tons of Bessemer rails. In quoting on rails the mills have returned to the former practice of quoting only the gross ton price, and we have revised our quotations as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—The car inquiry still outstanding includes 100 box, 50 hopper and 50 coal cars for the Illinois Traction Company; for the Seaboard Air Line, 50 cabooses; for the Chicago, Burlington & Quincy, 1000 center sills; for the San Pedro & Salt Lake City, 500 automobile cars; for the Illinois Central, 500 stock cars; for the Rock Island, 300 underframes, and for the New York Central Lines, 600 underframes. The car builders are making some tentative inquiries for materials, but for the most part find prices and deliveries such as to preclude the securing of orders from the railroads. Contracts for fabricated steel reported last week were negligible, including only two small jobs, one a post office at Evansville, Ind., and the other a boiler house at Racine. Fabricators in this district report their capacity well occupied for the time being, but the future holds little promise of anything but work involving the small amounts of steel. Some instances of mills having approached their trade with regard to structural material for last half delivery suggests that instead of being oversold they were more conservative in the disposition of their output than the demand for structural steel has warranted. We quote for Chicago delivery of structural steel from mill for last half shipment 2.589c.

In volume, the movement of material from jobbers' stocks is still upward, though there is some evidence that buying from store is being attracted to the largest jobbers by reason of their better stocks. We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—The scarcity of plates continues to represent the extreme condition in steel shortage. For prompt shipment orders have been taken at prices as high as 4.20c., Pittsburgh, while for last-half contracts, which a few of the mills are now prepared to negotiate, some 3000 tons having been booked last week, from 3.60c. to 3.75c., Pittsburgh, is being asked. Inquiry is continuous, but is generally of two classes, that from the shipbuilders of the Pacific coast and Orient, and the lesser requirements of the small boiler and tank shops. A sale of 400 tons of universal mill plates for third-quarter delivery has been made by an eastern Pennsylvania mill at 4.10c., f.o.b. mill. We quote for Chicago delivery of plates from mill on contracts 3.089c. to 3.689c., and for prompt shipment 4.189c.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—Makers of black sheets appear willing to market their product without too close a regard for the price of sheet bars in order to insure the operation of their mills. This is particularly true of Bessemer sheets, as has been emphasized before. This situation, together with the anticipated increase in the supply of semi-finished steel, is making for a range of prices for black sheets, which at the lower level is a considerable concession from the quotations of those mills having demand for their semi-finished steel for other forms of finished products. The steadily declining price of spelter is not yet sufficiently a factor in the cost of galvanized sheets to change the situation greatly, although somewhat better prices are obtainable on the heavier gages. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.189c.; box annealed, No. 17 and higher, 3.089c. to 3.189c.; No. 28 galvanized, 5.039c. to 5.089c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

Bars.—The closing of implement contracts for bars for first-half delivery will shortly become general, one small contract covering 1500 to 2000 tons having been closed. Aside from this buying, new business in mild steel bars is largely limited to purchases, through the makers of deformed bars, for reinforcing purposes. Activity in high-carbon bars is also largely occasioned by demand for concrete construction, the business from implement and bed manufacturers being comparatively light. The mill at Moline has been down for a week, and in general the call seems to be for the lighter sections, militating against the balanced operation of the mills. Bar-iron mills are taking enough business to maintain a comfortable position, but new offerings are not exceptional in quantity. We quote, mill shipment, Chicago, as follows: Bar iron, minimum, 2.35c.; soft steel bars, 2.689c.; nominal on contracts, 3.18c. for prompt shipment; hard steel bars, 2.50c. to 2.75c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c., base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 10 per cent above list.

Rivets and Bolts.—A further advance of 5 per cent in the prices of carriage and machine bolts is announced, notwithstanding some makers are selling at prices considerably under the generally adopted schedule. Con-

tracts for large quantities have been closed in the last week, particularly with the railroads, and sales of 15,000 kegs of nuts by one interest are noted. The selling of rivets has also been active and 3.75c. has been done in several instances. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 3.50c. to 3.75c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to ⅞ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to ⅞ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Wire Products.—The quotation of an advance of $2 per ton on wire nails and plain wire by some of the mills has not become general but, in view of the marked pressure upon these forms of wire, in contrast with others, the distinction in price is far from surprising. We quote as follows: Plain wire, No. 8 and coarser, base, $2.639; wire nails, $2.689; painted barb wire, $2.839; galvanized barb wire, $3.539; polished staples, $2.839; galvanized staples, $3.539, all Chicago.

Cast-Iron Pipe.—The Glamorgan Pipe & Foundry Company will furnish 200 tons of pipe for Denmark, Wis., and the leading interest 250 tons for Akron, Ohio. Quotations are being received at Newton, Kan., for 1800 tons; at Brookfield, Ill., for 560 tons, and at Fargo, N. D., for 176 tons. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $33.50 to $34; 6 in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Old Material.—Buying of scrap by consumers in the past week appears to have been sufficient only to bring out the weakness of the market and to establish new low prices. Purchases of No. 1 wrought at $16, No. 1 busheling at $13, No. 2 wrought at $14.50 and steel angles at $15 are instances. Rerolling rails have sold at $17, and for the first time in many weeks lower prices are offered for steel car axles. Machine shop turnings are especially weak. Offerings of railroad scrap include 600 tons from the Monon, 1200 tons from the Wabash, 4000 tons from the Northern Pacific, 3000 tons from the Rock Island, 3200 tons from the Burlington and small lists from the Grand Trunk and Big Four. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.00 to $18.50
Relaying rails	19.50 to 20.50
Old carwheels	13.00
Old steel rails, rerolling	17.00 to 17.25
Old steel rails, less than 3 ft.	17.00 to 17.50
Heavy melting steel scrap	15.75 to 16.25
Frogs, switches and guards, cut apart	15.75 to 16.25
Shoveling steel	14.75 to 15.25
Steel axle turnings	10.25 to 10.75

Per Net Ton

Iron angles and splice bars	$18.25 to $18.75
Iron arch bars and transoms	19.50 to 20.00
Steel angle bars	15.00 to 15.25
Iron car axles	24.00 to 24.50
Steel car axles	25.00 to 25.25
No. 1 railroad wrought	16.00 to 16.25
No. 2 railroad wrought	14.50 to 14.75
Pipes and flues	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	9.00 to 9.50
Cut forge	9.00 to 9.50
Steel knuckles and couplers	15.25 to 15.50
Steel springs	15.75 to 16.00
No. 1 boilers, cut to sheets and rings	10.75 to 11.25
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	19.50 to 20.00
Machine shop turnings	7.00 to 7.25
Cast borings	6.50 to 7.00
No. 1 cast scrap	12.50 to 13.00
Stove plate and light cast scrap	10.00 to 10.50
Grate bars	10.50 to 10.75
Brake shoes	11.00 to 11.25
Railroad malleable	13.00 to 13.50
Agricultural malleable	11.25 to 11.75

The Philadelphia offices of the Youngstown Sheet & Tube Company have been removed from the Widener Building to rooms 1615 and 1616, Pennsylvania Building. The offices of the Western Conduit & Mfg. Company, an allied interest, have also been removed to the Pennsylvania Building.

Philadelphia

PHILADELPHIA, PA., May 23, 1916.

Except for indications of weakness in pig iron and old material there is but little change to report. Whatever softness there may be in pig iron is slight and pertains principally to forward deliveries. The market is quiet. Old material is stagnant, with not enough business to test prices, and the surplus of scrap makes it almost certain that when activity begins it must be at lower levels. In finished steel products the strongest aspect is presented by plates, for which the demand is unceasing. Bars are a trifle spotty as to price. New structural shape business is restricted, partly by the filled-up condition of the mills and partly by a lack of disposition on the part of consumers to pay ruling prices. Billets continue firm, although a sale was made under unusual conditions at $45 for rerolling steel. The spot ferromanganese market is softer because of offerings by domestic makers, but new producers have not reached the point where they can offer material in any considerable quantity.

Pig Iron.—A foundry in Berks County, Pa., is reported to have closed for 3500 tons of foundry iron for delivery in the first half of 1917. Unofficially the price is said to have been under $20.50 delivered. Otherwise the market presents little of interest. The quiet trend has continued, and become more pronounced. In the main, quotations are unchanged, although here and there it is reported that concessions have been offered, most of which have to do with forward deliveries, though they have applied also in some cases where shipments have been diverted from the original buyers who found themselves over-supplied because of labor troubles. It is principally buyers who regard the price situation as easier. Difficulty in making deliveries has also been a cause of diverting shipments. Fundamentally the market is as strong as ever, despite the fact that there is ample iron available, and it is a question if production is not exceeding consumption. Some basic has been taken in the past few days and at a low price, but the details of the purchase are being closely held. The makers of low phosphorus are busy filling commitments, and a moderate amount of current business is being taken. Furnaces which were having trouble in getting coke a few weeks ago are now being supplied freely, a situation which has released a great many freight cars, indicating greater ease in that direction. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$20.50 to $21.00
Eastern Pa., No. 2 plain	20.25 to 20.75
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	19.50
Basic	20.50 to 21.00
Standard low phosphorus	34.00 to 35.00

Iron Ore.—Arrivals at this port in the week ended May 20 consisted of 4900 tons from Cuba and 2953 tons from Sweden.

Ferroalloys.—Spot 80 per cent ferromanganese is easier on offerings of domestic material, but large quantities are not involved. For spot the quotation is about $300, seaboard, and for July and August about $250. Representatives of the English makers continue to ask $200, seaboard, for last quarter and $175 for first half, but these prices are being shaded by domestic makers, who will sell limited quantities at $175 for delivery in December and January. The entire market is quiet. A cargo of 2300 tons of Cuban manganese ore has arrived at Baltimore, and there is on the market a cargo of about 5000 tons of Brazilian manganese ore. Contract ferrosilicon, 50 per cent, is unchanged at $83 to $85, Pittsburgh, according to quantity; 10 per cent is quoted at $34.44, delivered, and 11 per cent at $35.44. Contract spiegeleisen is quoted from $60, furnace, upward.

Plates.—The booked tonnage continues to increase and the mills have instructed selling forces to be more careful in accepting orders. The quotation of the larger eastern Pennsylvania mills is unchanged at 4c., Pittsburgh, or 4.159c., Philadelphia, but 3.909c., Phila-

delphia, continues to be done, some of the railroads being buyers at this figure. The mills are only making contracts where tonnages are specified for definite requirements. At least one large railroad has inquired for 1917 delivery.

Rails.—No new rail business is reported, although some inquiry is still pending.

Bars.—The market for steel bars is a trifle spotty. While the nominal quotation is 2.909c., Philadelphia, up to 4.159c. has been done. Iron bars are unchanged at 2.659c., Philadelphia, for carloads. The inquiry for steel rounds is heavy, quotations ranging from 3.50c. to 4c.

Structural Material.—The pressure on eastern Pennsylvania mills, calling for shipments against contracts, is maintained and their quotation is unchanged at 3.159c., Philadelphia. Jobbers are having their troubles in supplying certain sizes of which their stocks are depleted. No new noteworthy structural propositions are before the trade in this territory.

Billets.—Open-hearth rerolling billets are held at $50 to $55, and there have been good sales of forging billets at $65, one such sale involving 3000 tons. The delivery being specified is mostly third quarter, although demand for the fourth is looming up stronger. The only semblance of weakness, such as is reported at Pittsburgh, concerns a sale made by one mill to a competitor, where $45 was accepted for a lot of rerolling billets under a special arrangement. A leading producer continues out of the market. Steel-round discard steel continues in good demand, the price depending on the purpose for which it is required.

Sheets.—Eastern Pennsylvania makers have but little to offer, and their quotation for No. 10 blue annealed is unchanged at 3.909c. to 4.159c., Philadelphia.

Coke.—The freight movement is better. Furnaces which had over 200 cars of coke en route a few weeks ago, now have less than 100. In the week there has been some business in spot furnace at about $2.60 per net ton at oven. Spot furnace is quoted at $2.25 to $2.65 per net ton at oven, and contract at $2.65 to $3. Spot foundry is quoted at $3.50 to $4 per net ton at oven, and contract foundry at $3.50 to $3.75.

Old Material.—The market is at a standstill, and prices are only nominal at best. Harrisburg, Parkesburg, Coatesville and Conshohocken are under embargo, while there is a hold-up at Duncannon. In some cases mills have received material faster than they could dispose of it, inasmuch as their storage space is limited, causing them to ask a suspension of deliveries. All told, there is a surplus of material, and the tone of the market is weak. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$16.00 to $16.50
Old steel rails, rerolling	18.00 to 19.00
Low phos. heavy melting steel scrap	22.50 to 23.25
Old steel axles	26.00 to 27.00
Old iron axles	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	16.50 to 17.00
No. 1 railroad wrought	22.00 to 22.50
Wrought-iron pipe	13.50 to 14.00
No. 1 forge fire	14.50 to 15.00
Bundled sheets	14.50 to 15.00
No. 2 busheling	11.00 to 11.50
Machine shop turnings	9.00 to 9.50
Cast borings	10.00 to 10.50
No. 1 cast	17.50 to 18.00
Grate bars, railroad	13.50 to 14.00
Stove plate	13.00 to 13.50
Railroad malleable	14.50 to 15.00

Circular No. 59, entitled "United States Baumé Hydrometer Scales," was prepared by the Bureau of Standards for the purpose of clearing up certain erroneous ideas in regard to the origin of the Baumé scales in use in the United States. Special attention is devoted to the Baumé scale for liquids lighter than water and reasons are given to show why the scale based on the modulus 140 should be used to the exclusion of all others.

Cincinnati

CINCINNATI, OHIO, May 24, 1916.—(*By Wire.*)

Pig Iron.—The Southern Railway, through a subsidiary company, has put out an inquiry for 1600 tons of Southern foundry iron for last half shipment. The general inquiry from the foundry trade is light, and not much business is being figured on by outside salesmen. The Southern price situation has been the cause of considerable comment in the past few days. While $15, Birmingham basis, is the minimum for shipment in the last half of this year, a few contracts have been made at the same figure for delivery in the first half of 1917. Some business for spot shipment has also been taken lately at $14.75, but this is said to be for special analysis iron that did not come up fully to strictly No. 2 foundry standards. A local foundryman booked 500 tons of No. 2 foundry for shipment in the first half of next year. Northern foundry iron is held by the furnaces at $19, Ironton, but resale iron is still on the market at $18.50 for any shipment this year. The Ohio silvery irons are weaker and $27 at furnace for 8 per cent can be done for shipment either this year or in the first half of next. A little spot business was taken in Indiana 50c. per ton below this price. It is rumored that Michigan stove makers have lately placed some attractive orders for Southern foundry iron, with shipments extending through the first half of next year. No confirmation as to tonnage involved has been available. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$18.40 to $18.90
Southern coke, No. 2 f'dry and 2 soft	17.90 to 18.40
Southern coke, No. 3 foundry	17.40 to 17.90
Southern coke, No. 4 foundry	16.90 to 17.40
Southern gray forge	16.40 to 16.90
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	21.26
Southern Ohio coke, No. 2	20.26
Southern Ohio coke, No. 3	19.76
Southern Ohio malleable Bessemer	20.26
Basic, Northern	20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(*By Mail*)

Finished Material.—A slight let-up in business is reported from nearly all sources. This does not apply to dealers in building hardware and mill supplies, who are now busier than at this time last year. The high cost of building material has undoubtedly retarded operations to a certain extent, but the showing as compared with last year at this time is very flattering, in spite of adverse weather conditions that have tended to hold up many small and a few large contracts. Local jobbers are still able to make prompt deliveries on practically all kinds of iron and steel, but in some cases it is necessary to cut down orders so that stocks on hand can be distributed among customers who urgently need different materials. The jobbers' price on wire nails is firm at $2.75 per keg, base, and on barb wire, $3.60 per 100 lb. No. 10 blue annealed sheets are reported firm at 3.50c.; plate, 3.50c., and small structural shapes, 3.20c. The mill price of No. 28 galvanized sheets is 5.15c., Cincinnati, or Newport, Ky., and on No. 28 black sheets, 3.15c. to 3.20c.

Coke.—No contracts for either furnace or foundry coke are reported. A number of small fill-in purchases of 72-hr. coke have been made, but the aggregate amount is limited. Prices in the Connellsville district are a little firmer in spite of the light demand, and from $2.25 to $2.50 per ton at oven is quoted on furnace coke for shipment this year, with some brands held at higher prices. Spot foundry coke is unchanged in the Connellsville, Wise County, and Pocahontas fields around $3.50 to $3.75 at oven. New River foundry coke is stationary at $4 to $4.25.

Old Material.—The slack demand for all kinds of scrap has caused a weakness in prices, and it is hard to obtain the exact value of different grades. In some cases dealers are taking business at the minimum market prices. Although the consumption of scrap iron is at a high level, the inbound shipments are heavy enough to offset the outbound movement. The follow-

ing are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

	Per Gross Ton	
Bundled sheet scrap	$11.75 to	$12.25
Old iron rails	15.75 to	16.25
Relaying rails, 50 lb. and up	21.25 to	21.75
Rerolling steel rails	15.00 to	15.50
Heavy melting steel scrap	14.25 to	14.75
Steel rails for melting	13.50 to	14.00
	Per Net Ton	
No. 1 railroad wrought	$13.50 to	$14.00
Cast borings	5.50 to	6.00
Steel turnings	5.50 to	6.00
Railroad cast scrap	11.25 to	11.75
No. 1 machinery scrap	13.00 to	13.50
Burnt scrap	8.25 to	8.75
Iron axles	20.25 to	20.75
Locomotive tires (smooth inside)	18.00 to	18.50
Pipes and flues	9.75 to	10.25
Malleable and steel scrap	11.00 to	11.50
Railroad tank and sheet scrap	8.75 to	9.25

Buffalo

BUFFALO, N. Y., May 23, 1916.

Pig Iron.—Inquiry the past week has been light, with sales showing a total of about 8000 tons of various grades, in lots of 500 tons and over. The furnaces of this district are so well booked up that light sales and inquiries have no appreciable bearing on prices. There is little inclination to take on additional business, and the producers show little disposition to consider 1917 contracts. Pig-iron shipments east via the Erie Canal have been held up for the past week on account of floods closing the canal to traffic. The State waterway will be opened again during the present week. There is no distinction between the 1916 and the 1917 prices although some tonnages, booked and extending over the remainder of the year, were placed at an equivalent of $18.50 for No. 2 X foundry on the portion of the contracts extending into 1917. One producer, however, has named $18.50 to $19 as the range from low to higher grades for such tonnage as it has booked for 1917. We quote for current and last half delivery, f.o.b. Buffalo, as follows:

No. 1 foundry	$19.00 to	$20.00
No. 2 X foundry	18.50 to	19.00
No. 2 plain	18.25 to	18.75
No. 3 foundry	18.25 to	18.75
Gray forge	18.50 to	19.00
Malleable	18.50 to	19.50
Basic	19.00 to	19.50
Bessemer	21.00 to	22.00

Finished Iron and Steel.—Buyers are realizing more fully that mills are not getting into a position where improvement in deliveries may be expected. They are obliged to wait for deliveries on orders placed for months, securing from warehouse stocks the materials urgently needed. Some consumers are sounding the market to see if mills will accept orders for deliveries far into the future, so as to obtain the benefit of price readjustments should the market change. Mills, however, are holding more firmly to the definite sales contracts on orders for future needs, and are declining to incorporate a clause that will give the buyer the advantage of possible price reductions.

Old Material.—The principal movement of material purchased here is to the Pittsburgh and Valley districts. The principal user of heavy melting steel continues out of the market, but is taking on a steady amount of scrap purchased under contract. The market is gliding along, and dealers are not disposed to accept contracts for tonnages of any considerable amount at present prices, feeling that the bottom of the market has been reached. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel		$17.00
Low phosphorus steel	$20.00 to	20.50
No. 1 railroad wrought scrap	19.00 to	19.50
No. 1 railroad and machinery cast scrap	16.00 to	16.50
Old steel axles	24.00 to	24.50
Old iron axles	24.00 to	24.50
Old carwheels	14.00 to	14.50
Railroad malleable	15.50 to	16.00
Machine shop turnings		8.00
Heavy axle turnings		12.00
Clean cast borings	9.25 to	9.50
Old iron rails	18.00 to	18.50
Locomotive grate bars	12.00 to	12.50
Stove plate (net ton)	11.50 to	12.00
Wrought pipe	14.00 to	14.50
Bundled sheet scrap	12.50 to	13.00
No. 1 busheling		14.50
No. 2 busheling		11.50
Bundled tin scrap	15.00 to	15.50

Cleveland

CLEVELAND, OHIO, May 23, 1916.

Iron Ore.—Ore shipments are very heavy and are expected to exceed 7,000,000 tons in May. The movement may break former records for the month. No sales are reported. We quote prices as follows, delivered lower Lake ports: Old Range Bessemer, $4.45; Mesaba Bessemer, $4.20; Old Range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—The United Steel Company, Canton, Ohio, has purchased 5000 tons of resale basic iron for May and June delivery. This iron will be furnished by a Cleveland furnace, being a part of a lot purchased some time ago by a New York syndicate. The price is understood to have been about $18.75, delivered. Of the 5000 tons of foundry iron reported purchased for the Cleveland plant of the Westinghouse Electric & Mfg. Company for the last quarter, 2000 tons of No. 3 was taken by a Cleveland furnace at about $18.75, delivered. It is understood that the taking for early delivery of some low price tonnage on a previous contract was a price factor in this transaction. The purchase included a round lot of Southern iron at $14.75, Birmingham, for No. 2. The market is not firm and in general is dull, although one Cleveland interest reports sales this month aggregating 50,000 tons. Southern iron is weak. It is quoted at $15, Birmingham, for No. 2 for last half and $15.50 for first half. A great deal of Southern iron is available in warrants at $14.50 and some is offered under $14. We quote, delivered Cleveland, as follows:

Bessemer	$21.95 to	$22.45
Basic	18.95 to	19.30
Northern No. 2 foundry	19.00 to	19.30
Southern No. 2 foundry	18.50 to	19.50
Gray forge		18.75
Jackson Co. silvery, 8 per cent silicon	28.62 to	30.62
Standard low phos., Valley furnace		32.00

Coke.—The Toledo Furnace Company, Toledo, Ohio, started up its by-product coke ovens last week. This is a Koppers plant with 94 ovens and a daily capacity of about 1000 tons, or sufficient to supply fuel for the company's two stacks. The market is dull and prices on foundry grades for prompt shipment are weaker, this being attributed to some extent to the surplus caused by the cutting off of eastern shipments because of foundry labor troubles. We quote best makes of Connellsville foundry coke at $3 to $3.25 for prompt shipment and $3.25 to $3.50 for contracts.

Bolts, Nuts and Rivets.—Bolt prices have been advanced about 5 per cent, nuts being unchanged. The scarcity and high price of labor are factors in the present advance. There has been heavy contracting during the past few days, and makers are getting farther behind on deliveries. Rivets have been advanced $5 a ton for third quarter, being now quoted at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets for carload lots for delivery during the last half. These prices have prevailed recently for the fourth quarter. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, 40; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, $2.90 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. square nuts, blank or tapped, $2.60; hexagon nuts, all sizes, $3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Finished Iron and Steel.—New demand is light, although there is a fair volume of inquiry for third and fourth quarter contracts. Most manufacturers have anticipated requirements sufficiently to secure good-sized stocks, and pressure for deliveries on material actually needed has eased up. Bessemer steel bars and structural material are being offered at 3c., Pittsburgh, for early shipment. Plates are firm at 3.50c. to 4c., Pittsburgh, for early delivery. Considerable structural work is coming out for small buildings, but no large building projects are pending. The Penn Bridge Company has taken 500 tons for the new Cleveland plant of the Grant Motor Company and the National Iron &

Wire Company has taken 110 tons for a factory building for the National Screw & Tack Company, Cleveland. The New York Central Railroad has inquiries out for about 500 tons for bridge work. The demand for hard steel bars continues fairly active, with prices ranging from about 2.50c. to 2.75c., delivered Cleveland, for early shipment. Iron bars are quoted at 2.50c. to 2.60c., Cleveland. The demand for sheets is fairly heavy and several Ohio mills are sold up for several months ahead and are out of the market. The only sheets not moving well are light weight black sheets in roofing sizes. One mill is closing out its stock of these at 2.40c., but this does not represent the mill order prices. Some mills are asking as high as 3.50c. to 3.70c. for blue annealed sheets. We quote black sheets at 2.90c. to 3c., Ohio mill, for No. 28; blue annealed at 3c. to 3.25c. for No. 10 and galvanized at 5c. for No. 28. Warehouse prices are unchanged at 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Old Material.—A Cleveland mill has purchased a round lot of heavy melting steel for July delivery, and some small-lot sales of this grade are reported. Taken as a whole, the market is dull. Mills are not actively in the market and dealers are selling at current prices only the material on track that they must move quickly. For future delivery they are asking about 50c. a ton above the current price. The embargo on the plant of the Upson Nut Company has been lifted, but an embargo has been declared against the Brier Hill Steel Company in Youngstown. Corrigan, McKinney & Co. will resume taking scrap about June 1. A recent sale of railroad malleable scrap by the Lake Shore Railroad was made to a Youngstown mill at $16.10. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Old steel rails	$16.00 to $16.25
Old iron rails	19.00
Steel car axles	28.00 to 29.00
Heavy melting steel	16.00 to 16.25
Old carwheels	13.50 to 13.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	13.00 to 13.25
Railroad malleable	16.00 to 16.25
Steel axle turnings	13.00 to 13.25
Light bundled sheet scrap	13.00 to 13.25
Per Net Ton	
Iron car axles	$23.00 to $24.00
Cast borings	7.50
Iron and steel turnings and drillings	7.50
No. 1 busheling	14.00 to 14.25
No. 1 railroad wrought	17.00 to 17.50
No. 1 cast	14.00 to 14.25
Railroad grate bars	11.75 to 12.00
Stove plate	11.25 to 11.50

Birmingham

BIRMINGHAM, ALA., May 22, 1916.

Pig Iron.—The leading interest has established a basis for business covering a longer period than heretofore attempted by Birmingham iron makers. It has named $15.50 as the price of iron for the first half of 1917, as well as the last half of 1916. Fixing a quotation for an entire year is unprecedented. Some selling for 1917 has taken place at this figure. No large tonnages have been recently booked, but every furnace company seems to have picked up business at $15 and $15.50 for spot and second half. Some Clifton special iron has sold at $18.50. A small lot of No. 2 brought $15.25 spot cash and one maker sold 1000 tons for delivery through July at $15.50. So far as is known, no furnace interest has sold Birmingham iron under the Birmingham basis. Warrants are exercising a sentimental influence, but one hears of little or no actual transactions in them. Low prices on warrants have been named—say 50 to 75c under the market—but the details connected with the warrant business are not apparently alluring. Asked as to causes of the persistent lull in the market a prominent manufacturer said: "The record output, for one thing. But I regard the enormous increase in the use of scrap by our Southern foundries as a leading cause of existing conditions. This scrap has been accumulating during the dull season and now that iron is $4 per ton higher than scrap, instead of the usual differential of $2, foundrymen are melting more scrap than they ever did. Again, while the car shops have orders for cars plentiful enough, they cannot secure the steel underframes and other steel parts as desired, and it follows that they are not taking the amount of pig iron they otherwise would." The gratifying feature of the situation is the regularity with which consumers are ordering out their metal. For each delay order received, there is one of anticipation. Car movements in Alabama in April (30 days) were 82,498, as compared with 86,000 in March (31 days), and showed an increase of 20,000 cars over April, 1915. We quote, per gross ton, f. o. b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.50 to $16.00
No. 2 foundry and soft	15.00 to 15.50
No. 3 foundry	14.50 to 15.00
No. 4 foundry	14.25 to 14.75
Gray forge	14.00 to 14.50
Basic	15.00 to 15.50
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—Running from 80 per cent capacity to full time and double turn is the report from the large water pipe shops at this time. All sections of the country except the East are represented in new orders, none very large but considerable in the aggregate. No new export business is reported. We quote, per net ton, f. o. b. pipe shop yards, as follows: 4-in., $29; 6-in. and upward, $26, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke. — Steam coal maintains its recent slight recovery, with indications of further improvement in demand and price with the renewal of contracts next month. Coke moves as fast as manufactured, with a large majority of available ovens in blast and prices ruling at $4.50 per net ton at oven for standard Brookwood and Yolande beehive foundry makes. Very desirable, or strongly competitive, business might be booked 25c under. Cars are intermittently scarce. The Texas movement continues active.

Old Material.—For the third week in succession scrap dealers have characterized the market as softer. Steel scrap has been among the items that have recently sagged. Large quantities of scrap have been dumped on the market and yards have filled. An exception is to be found in old steel axles, which are in demand for export. We quote, per gross ton, f. o. b. Birmingham district yards, price to the consumer, as follows:

Old steel axles	$26.00 to $26.50
Old steel rails	12.00 to 12.50
No. 1 steel scrap	10.75 to 11.25
No. 1 wrought scrap	16.00 to 16.50
No. 1 cast scrap	11.00 to 11.50
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	10.00 to 10.50
Tram carwheels	10.50 to 11.00

St. Louis

ST. LOUIS, MO., May 22, 1916.

Pig Iron.—The feature has been the wide spread in the prices of different furnaces, ranging from $15 to $16.50 for No. 2 Southern foundry, Birmingham basis, with all furnaces holding firmly. The National Enameling & Stamping Company's inquiry for 15,000 tons of basic is unfilled, because of an unwillingness to contract at prices quoted for Northern or Southern iron. Inquiries still pending include one for 1000 tons of Lake Superior charcoal iron, one for 1000 tons of Northern coke iron and a second inquiry for 1000 tons of Lake Superior charcoal iron.

Coke.—The 10,000-ton lot of furnace coke, asked for recently, has not been closed. Quotations continue on the basis of Connellsville and Virginia oven figures, with local by-product coke quoted on a parity therewith.

Finished Iron and Steel.—The general run of business is good and the outlook is satisfactory, with architects' boards well filled. No new large jobs have come out, but the aggregate of small work is good. Track fastenings are in active request, specifications on contracts being pressing. Movement out of warehouse is good, with prices strong. We quote for stock out of warehouse as follows: Soft steel bars, 3.15c.; iron bars,

3.10c.; structural material, 3.15c.; tank plate, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold-rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5.55c.

Old Material.—There is no buying and practically no selling. Dealers are taking material only for specific needs, and are not even trading among themselves. Embargoes still prevail at local industries, but they are still working full and therefore are reducing their stocks rapidly. Lists out during the week included 2000 tons from the Wabash and 5000 tons from the Northern Pacific, as well as 3500 tons from the Chicago, Burlington & Quincy. Relayers are in demand and hard to get. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

	Per Gross Ton	
Old iron rails	$17.00 to	$17.50
Old steel rails, rerolling	16.00 to	16.50
Old steel rails, less than 3 ft.	16.50 to	17.00
Relaying rails, standard section, subject to inspection	22.00 to	23.00
Old carwheels	12.00 to	12.50
No. 1 railroad heavy melting steel scrap	16.00 to	16.50
Heavy shoveling steel	12.75 to	13.25
Frogs, switches and guards cut apart	15.00 to	15.50
	Per Net Ton	
Iron angle bars	$16.00 to	$16.50
Iron car axles	23.50 to	24.00
Steel car axles	25.00 to	25.50
Wrought arch bars and transoms	19.25 to	19.75
No. 1 railroad wrought	15.50 to	16.00
No. 2 railroad wrought	15.25 to	15.75
Railroad springs	14.00 to	14.50
Steel couplers and knuckles	14.00 to	14.50
Locomotive tires, 42 in. and over, smooth inside	19.00 to	19.50
No. 1 dealers' forge	10.50 to	11.00
Cast borings	6.50 to	7.00
No. 1 busheling	13.00 to	13.50
No. 1 boilers, cut to sheets and rings	9.25 to	9.75
No. 1 railroad cast scrap	12.00 to	12.50
Stove plate and light cast scrap	9.00 to	9.50
Railroad malleable	11.25 to	11.75
Agricultural malleable	10.25 to	10.75
Pipes and flues	10.50 to	11.00
Railroad sheet and tank scrap	9.75 to	10.25
Railroad grate bars	9.00 to	9.50
Machine shop turnings	7.50 to	7.75
Bundled sheet scrap	10.00 to	10.50

New York

NEW YORK, May 24, 1916.

Pig Iron.—Quiet as the market is, there is a feature of interest in the fact that quite a number of foundries still have to buy metal for this year. Out of 6000 to 8000 tons pending in this market more than two-thirds is for 1916 delivery. A brake shoe company which recently bought malleable is still in the market for 2000 tons of high silicon iron and a Connecticut malleable interest has closed or is about to close for 1500 tons of 2.50 to 3 per cent silicon iron. At Newark three inquiries are pending which are for 500, 700 and 750 tons respectively, and a river front plant in New Jersey is asking for 1000 tons. An eastern Pennsylvania car works is in the market for about 2000 tons. Buffalo furnaces have not figured to any great extent in recent Eastern business. From central Pennsylvania furnaces iron has been sold at $18.50 to slightly higher for No. 2 X and on closely competitive business recent quotations of eastern Pennsylvania furnaces have been shaded. Some basic iron has been taken by an eastern Pennsylvania steel company and it is in the market for more. Southern warrants are lower, speculative holders showing some fear of over-staying. Alabama warrants have sold at $14 and as low as $13.75 has been done. The New England foundries are not suffering from the present embargo. From Lehigh Valley points shipments are possible via Delaware & Hudson to Boston & Maine points. The Pennsylvania Railroad is still embargoed against the New Haven on pig iron but to most New England points coke shipments are possible. We quote at tidewater for early delivery: No. 1 foundry, $21 to $21.25; No. 2 X, $20.50 to $20.75; No. 2 plain, $20.25 to $20.50; Southern iron at tidewater, $20.75 to $21 for No. 1 and $20.25 to $20.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Active demand for ferromanganese is less than at any time since the war started. Inquiries for prompt or contract material are very few and there have been only occasional sales for either delivery in the past week. The quotation is still $175, seaboard, for 1917 delivery or $200 for last quarter of 1916, with a fair quantity available. Spot material can probably be obtained for $350 to $400, though a small lot was sold for $425 last week. Arrivals on contract are satisfactory, 3000 tons being expected this week at New York for delivery among large consumers. Another consignment of 1000 tons, due this week, is noted, also for delivery on contract. Spiegeleisen is quiet at $60 to $65, furnace, for last half. Ferrosilicon, 50 per cent, is strong and active.

Steel Plates.—Boiler makers and plate mills seem to be in agreement that steamboat rules are too stringent in respect to certain requirements; and to help in expediting deliveries a movement is on foot to secure a modification through the Department of Commerce and Labor. Meanwhile demand for shipbuilding is keeping up, conspicuous among buyers being representatives of a shipbuilding concern of Japan, which has placed 1500 tons for early 1917 shipment and has yet some 5000 tons wanted as early as possible this year. Practically no plates are obtainable in less than 10 weeks, except at 5c. per pound and higher, and the three-months' delivery commands 4c. to 4.25c., base, Pittsburgh. We quote mill shipments at 3.919c., New York, and upward, and such for future business as the mills will consider at 2.919c., New York, and higher. Warehouse prices are 4c. to 4.50c., New York.

Iron and Steel Bars.—About 200,000 tons of war steel, mostly in the nature of 6 to 12 in. billets or blooms, is still in the market and for delivery this year. In a week or ten days this, it is thought, will be settled. It is now estimated that upward of 350,000 tons of shell steel for direct shipment abroad and in this year has been bought in the last ten days. Plants in this country equipped for forging and for machining shells are not, however, finding new business in corresponding proportions and prices for such work have softened in view of capacity which before long may not be engaged. Merchant steel bars appear somewhat easier and Bessemer bars are obtainable in six to 10 weeks, though the price is 3c., Pittsburgh. It is doubtful if iron bars can be bought for as early shipment and bar iron and bar iron products are strong, with another advance in nuts and bolts effective May 17 and averaging about 5 per cent on bolts. For mill shipments of iron bars we quote 2.669c., New York, and for steel bars 2.769c. to 2.919c., New York, for deferred delivery and about 3.169c., New York for early delivery. Warehouse prices for iron and steel bars are 3.25c. to 3.50c., New York, and for large lots somewhat under these prices.

Structural Material.—Fabricators seems as much concerned over their ability to keep large enough working forces for the work in hand as they are watchful of the new work yet to appear. Added to the springtime restlessness is the magnet which draws to the munitions plants. From now on until after the summer no great building movement in the structural field is expected, and while keener competition on fabricated work is not unlooked for, nothing but sporadic instances of plain material price concessions are regarded possible, if indeed the demand for semi-finished steel will not keep up to such an extent as materially to strengthen finished steel prices. The largest tonnage jobs now under consideration are again New York subway work, and awards are now awaited on over 30,000 tons with bids shortly to go in on some 25,000 tons. Some sizeable industrial plant work has been closed, some of this placed through Westinghouse, Church, Kerr & Co., including 400 tons at Cleveland for the J. G. Brill Company, awarded to the Blaw Steel Construction Company; 250 tons for the Freeport Sulphur Company, Freeport, Tex., and 350 tons for buckstays at Buffalo. The General Electric Company has placed 500 tons for several buildings at Lynn, Mass., with the New England Structural Company; the Carpenter Steel Company, Reading, Pa., 400 tons with Lewis F. Shoemaker & Co.; the Ludlum Steel Company, Watervliet, N. Y., 700 tons with David Austin & Co.; the Vacuum Oil Company has closed for 300 tons at Paulsboro, N. J., and the Standard Leather Company, Newark, has placed 400 tons with the Hay Foundry &

Iron Works. The American Locomotive Company is to build a foundry at Schenectady, taking 300 tons; Gould & Eberhardt, Newark, N. J., is taking bids on a building involving 700 tons, and the Fox Film Corporation has studio buildings under consideration at Corona, L. I., taking 1500 or perhaps 3000 tons. The Chesapeake & Ohio has closed for 300 tons; the New Haven for 200 tons, the last for three bridges, and the American Bridge Company is to supply 250 tons for substructure contractor for the Thames River bridge for the New Haven. The Central Railroad of New Jersey is asking bids on a six-track bridge of 40-ft. span at Phillipsburg. Levering & Garrigues Company has been awarded 800 tons for the Klein & Jackson apartment, Madison Avenue and Seventy-second Street, and a Poli theater at New Haven, 750 tons has been closed. In new general building work mention may be made of 1000 tons for the New York Telephone Company, Walker & Lispenard Streets; 600 tons for the Cruikshank and Kilpatrick loft, 122 Pearl Street, and 650 tons for the Herzog apartment, 64 West Eighty-sixth Street. We quote mill shipments at 2.769c. to 3.169c., New York, depending on the urgency for delivery, and from warehouse at 3.25c. to 3.50c., New York, and for large lots below 3.25c.

Cast-Iron Pipe.—No public lettings of importance have been announced in this immediate territory. The Warren Foundry & Machine Company was the successful bidder at the letting of 172 tons at Wellesley, Mass., May 18. Private buying the past week has been in good volume. Prices are firm, especially on small sizes, on which most foundries are practically sold up for the next two or three months. Carload lots of 6-in., class B and heavier, are quoted at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Relaying rails are in active demand and prices are strong. Numerous inquiries are in the market not only from domestic buyers but from abroad, included among which is one for 200 miles of 50-lb. rails for Mexico. Indications point to still higher prices, in view of the fact that the mills are unable to take orders for rails for anything like early delivery. Old steel axles continue in good demand for export. These appear to be the only commodities classified as old material on which prices are maintained. The general market is quiet and weak. Dealers are finding great difficulty in making deliveries on contracts, partly because of embargoes and partly because of the increasing disposition by consumers to make rejections of scrap which would have easily passed inspection not long ago. Such allowances have been compelled, to induce acceptances of rejected material, that brokers have lowered their offerings to producers quite sharply. As the Pittsburgh market is no longer taking heavy melting steel scrap from this section of the country, a change has been made in the subjoined table in the method of quoting on this class of material. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$13.00 to $13.50
Old steel rails (short lengths) or equivalent	13.50 to 14.00
Relaying rails	28.00 to 30.00
Rerolling rails	15.50 to 16.00
Iron car axles	26.00 to 27.00
Steel car axles (for domestic use)	28.00 to 28.50
Steel car axles (for export)	.... 30.00
No. 1 railroad wrought	20.00 to 20.50
Wrought-iron track scrap	16.00 to 17.00
No. 1 yard wrought, long	15.00 to 15.50
No. 1 yard wrought, short	13.00 to 13.50
Light iron	6.50 to 7.00
Cast borings (clean)	8.25 to 8.50
Machine shop turnings	7.50 to 8.00
Mixed borings and turnings	7.00 to 7.50
Wrought pipe	11.00 to 11.50
Old carwheels	15.00 to 15.50
Malleable cast (railroad)	12.25 to 12.75

Foundries continue to purchase but sparingly. While some consumers are paying more for especially choice machinery cast, general quotations to consumers are as follows, per gross ton, New York:

No. 1 cast (machinery)	$17.00 to $17.50
No. 2 cast (heavy)	15.50 to 16.00
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

British Steel Market

Sales of American Billets—Pig Iron Dull—Tin Plate Strong

LONDON, ENGLAND, May 24, 1916.
(*By Cable*)

The pig-iron market is at a standstill and nominal with hematite iron unchanged. Tin plates are strong but quiet at 37s. American 4-in. billets for June delivery have sold for $63 c.i.f. Liverpool. There is more inquiry for black sheets at £20 5s. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 37s.

Cleveland pig-iron warrants, 86s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s against £19 15s last week.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £12 10s.

Steel bars, export, f.o.b. Clyde, £18 5s.

Ferromanganese, £40 to £45 nominal.

Ferrosilicon, 50 per cent, c.i.f., £29.

Iron and Industrial Stocks

NEW YORK, May 24, 1916.

Greater activity and generally higher prices have prevailed in the stock market the past week. Favorable developments have preponderated. The advance in railroad stocks appears to have given more confidence to holders of railroad equipment securities. While advances have been important in most of the industrial stocks, some have nevertheless been neglected. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com.	26¾ - 29¾	Republic, com.	47½ - 49⅝
Allis-Chal., pref.	81½ - 83¾	Republic, pref.	109 - 111¾
Am. Can, com.	56 - 58⅞	Sloss, com.	54 - 55½
Am. Can, pref.	111 - 112	Pipe, com.	22¼ - 23⅛
Am. Car & Fdy., com.	60¼ - 61¾	U. S. Steel, com.	84 - 86
Am. Car & Fdy., pref.	116¾ - 117¼	U. S. Steel, pref.	116½ - 117
Am. Loco., com.	68 - 72¾	Va. I. C. & Coke	48 - 51
Am. Loco., pref.	101⅛ - 101¼	Westing. Elec.	61¾ - 63⅜
Am. Steel Fdries.	52 - 53½	Am. Rad., com.	395 - 397
Bald. Loco., com.	86¼ - 90½	Am. Rad., pref.	136
Beth. Steel, com.	435 - 445	Am. Ship, com.	42 - 44½
Beth. Steel, pref.	135	Am. Ship, pref.	89
Case (J. I.), pref.	88	Chic. Pneu. Tool	72
Colo. Fuel	42½ - 45	Lake Sup. Corp.	9⅞ - 10⅜
Deere & Co., pref.	89 - 90	Pa. Steel, pref.	98¼ - 98½
Gen. Electric	168¼ - 174¾	Warwick	10¼ - 10⅜
Gt. No. Ore Cert.	40⅞ - 41⅞	Cruc. Steel, com.	83½ - 87
Int. Harv. of N. J., com.	113 - 113¾	Cruc. Steel, pref.	115⅝ - 117½
Int. Harv. Corp., com.	79⅞ - 84¼	Harb-Walk. Refrac., com.	94½ - 98
Lackawanna Stl.	70 - 72	Harb-Walk. Refrac., pref.	103
Nat. En. & Stm., com.	23 - 24½	La Belle Iron, com.	52 - 52⅞
N. Y. Air Brake	133 - 135½	La Belle Iron, pref.	128 - 128¼
Pitts. Steel, pref.	97 - 97½	Can. Car & Fdy., com.	70 - 72
Pressed Stl., com.	46¼ - 47¾	Can. Car & Fdy., pref.	85 - 94
Pressed Stl., pref.	100¾	Carbon Stl., com.	75½ - 76½
Ry. Stl. Spring, com.	40 - 42⅞	Driggs-Seabury	125 - 138
Ry. Stl. Spring, pref.	97½	Midvale Steel	61 - 63⅛

Dividends

The Republic Iron & Steel Company, regular quarterly, 1¾ per cent on the preferred stock, and an extra of 2 per cent on account of accumulated back dividends, payable July 1. This payment on account of back dividends on the preferred stock will leave 8 per cent yet to be paid.

The Gulf States Steel Company, regular quarterly, 1¾ per cent on the first preferred stock, payable July 1.

The National Lead Company, regular quarterly, 1¾ per cent on the preferred stock, payable June 15, and 1 per cent on the common stock, payable June 30.

The New York Air Brake Company, regular quarterly, 2 per cent, payable June 23.

The American La France Fire Engine Company, regular quarterly, 1 per cent on the common stock, payable May 15.

The Maxwell Motor Car Company, regular quarterly, 1¾ per cent on the first preferred stock, payable July 1.

The Underwood Typewriter Company, regular quarterly, 1¾ per cent on the preferred stock and 1 per cent on the common stock, payable July 1.

The American Laundry Machinery Company, 1 per cent on the common stock, payable June 10.

The General Electric Company, regular quarterly, 2 per cent, payable July 15.

The Moline Plow Company, regular quarterly, 1¾ per cent on the first preferred stock, payable June 1.

The Saxon Motor Car Corporation, initial dividend, 1½ per cent, payable July 1.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast, 65c.; on plates, structural shapes, iron and steel bars, pipe and boiler tubes, tin plates, nails, spikes and wire. The foregoing rates to the Pacific coast are by rail only.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in	.10
H-beams over 18 in	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive.	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive.	.50
Cutting to lengths under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Rods.—Bessemer, open-hearth and chain rods, $60, nominally.

Wire Products.—Prices to jobbers, effective May 1: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.45; galvanized, $3.15. Galvanized barb wire and staples, $3.35; painted, $2.65. Wire nails, $2.50 to $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.50	$2.55	$2.60	$2.65	$2.75	$2.85	$2.95	$3.05
Galvanized	3.20	3.25	3.30	3.35	3.45	3.55	4.00	4.10

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from April 21, 1916, on black and galvanized steel and iron pipe, all full weight.

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	63	30½	⅛ and ¼	52	19
½	67	46½	⅜	53	20
¾ to 3	70	50½	½	57	33
			¾ to 1½	60	38

Lap Weld

2	65	45½	1¼	48	26
2½ to 6	68	48½	1½	54	33
7 to 12	65	44½	2	55	34
13 and 14	53½	..	2½ to 4	57	37
15	51	..	4½ to 6	57	37
			7 to 12	56	36

Reamed and Drifted

1 to 3, butt	68	48½	¾ to 1½, butt	55	32
2, lap	63	43½	1¼, lap	43	20
2½ to 6, lap	66	46½	1½, lap	49	27
			2, lap	50	28
			2½ to 4, lap	52	31

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	35½	⅛, ¼ and ⅜	52	29
½	64	45½	½	57	38
¾ to 1½	68	49½	¾ to 1½	61	40
2 to 3	69	50½			

Lap Weld, extra strong, plain ends

2	63	44½	1¼	50	28
2½ to 4	66	47½	1½	55	34
4½ to 6	65	46½	2	57	37
7 to 8	61	40½	2½ to 4	59	40
9 to 12	56	35½	4½ to 6	58	39
			7 to 8	52	33
			9 to 12	47	28

Butt Weld, double extra strong, plain ends

½	55	38½	½	44	26
¾ to 1½	58	41½	¾ to 1½	47	29
2 to 2½	60	43½			

Lap Weld, double extra strong, plain ends

2	55	38½	1½	44	25
2½ to 4	57	40½	2	44	25
4½ to 6	56	39½	2½ to 4	46	30
7 to 8	51	30½	4½ to 6	45	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 to 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
No. 29	2.95 to 3.05
No. 30	3.15 to 3.25

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.75 to 3.85
No. 12	3.85 to 3.95
Nos. 13 and 14	3.85 to 3.95
Nos. 15 and 16	3.95 to 4.05
Nos. 17 to 21	4.10 to 4.20
Nos. 22 and 24	4.20 to 4.30
Nos. 25 and 26	4.35 to 4.45
No. 27	4.60 to 4.70
No. 28	4.75 to 4.85
No. 29	4.90 to 5.00

Above prices are for Bessemer stock. For open-hearth stock $2 per ton advance is charged.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes and standard charcoal-iron tubes, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	35	1½ in.	27
1¾ and 2 in.	47	1¾ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3¼ in.	55	3 and 3¼ in.	47
3½ to 4½ in.	56	3½ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
May	Lake	lytic	York	York	Louis	York	Louis
17	29.00	28.50	49.25	7.45	7.30	15.50	15.25
18	29.00	28.50	49.25	7.45	7.30	15.25	15.00
19	29.00	28.50	49.00	7.45	7.30	15.25	15.00
20	29.00	28.50	....	7.45	7.30	15.25	15.00
22	29.00	28.50	48.75	7.45	7.25	15.00	14.75
23	29.00	28.50	48.00	7.45	7.25	15.00	14.75

NEW YORK, May 25, 1916.

Copper is dull, lower and the market is soft. Tin has been quiet and prices have followed a slump at London. Lead has become easy in the absence of demand. Spelter is neglected and has further declined. Antimony has fallen off sharply and is the weakest of the metals.

New York

Copper.—The market is exceedingly dull and has been so for the past few days notwithstanding reports to the contrary. It has been stated repeatedly that there was a heavy unsatisfied demand for delivery in the last quarter of this year, and that consumers were eager to buy, but this is not borne out by their attitude when copper is offered to them. They have shown no interest when offered electrolytic in large quantities at 28.75c., full terms, for delivery in October, November and December, and they were no more interested when 28.50c., full terms, was quoted, but have said they are not buying so far ahead, and when they do buy it is solely to cover orders. Some have asserted their belief in the softness of the market and said that it would be unwise to buy at this time except against actual orders. Spot electrolytic is quoted at 29.50c. to 30c.; June and July at about 29.25c.; and August and September at 29c. Large quantities of resale metal are being offered by brokers and by mills whose labor troubles have lessened their consumption. Lake is nominally quoted at 29c., forward delivery. The exports this month, including yesterday, totaled 13,496 tons.

Tin.—A fair but not large business has been done in future shipments from the East, but to all outward appearances the market has been quiet. The trading has been confined to a few hands. Otherwise the only feature of the market was a radical break at London yesterday, when the market dropped £2 15s., the supposed cause being heavy arrivals of Banca tin at Liverpool. The New York market, on receipt of the news, declined from 48.75c. to 48c. The arrivals this month totaled 3102 tons, and there was afloat yesterday 3542 tons.

Lead.—The market has turned very quiet as to both domestic and foreign demand. Rumors are current of large export inquiries, but so far as can be learned these have not resulted in business. One inquiry called for 10,000 tons for export to Japan, which, if placed, is almost certain to go to the leading interest. This company continues to quote 7.50c., New York, and 7.42½c., St. Louis, but the prices of independent consumers are lower. They quote 7.45c., New York, and 7.25c., St. Louis. The exports this month, including yesterday, totaled 832 tons.

Spelter.—Business has been at a standstill despite offerings at lower levels. May spelter can be had easily at 14.75c., St. Louis, or 15c., New York. Sellers express themselves as firmly of the opinion that the turning point is almost here, but they admit that they have been deceived in this respect before. June spelter is quoted at about 14.50c., New York; July at 14c., and third quarter at about 13.50c. The exports this month, including yesterday, totaled 3251 tons.

Antimony.—The market is neglected and buyers show no interest despite radically reduced prices. It has reached a point where some sellers have decided to cease offering, inasmuch as they are not getting any business, but only bringing prices down. Prompt May shipment of Chinese and Japanese antimony can be had as low as 22c. and it is considered not improbable that certain sellers would accept 25c. for spot, the general quotation for which is 28c. Where a few weeks ago there was a scarcity there is now a surplus.

Aluminum.—The quotation for No. 1 virgin aluminum, 98 to 99 per cent pure, is unchanged at 58c. to 60c. Contracts for next year's delivery have been made at 35c., but this price was made only to regular consumers.

Old Metals.—The market is uncertain and declining, particularly zinc. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	26.50 to 27.50
Copper, heavy and wire	25.50 to 26.50
Copper, light and bottoms	22.00 to 23.00
Brass, heavy	15.50 to 16.00
Brass, light	12.50 to 13.50
Heavy machine composition	19.00 to 20.00
No. 1 yellow rod brass turnings	15.00 to 16.00
No. 1 red brass or composition turnings	16.00 to 17.00
Lead, heavy	6.50
Lead, tea	6.00
Zinc	11.00 to 12.00

Chicago

MAY 22.—With the exception of tin, metal prices are slightly lower. Lake copper is again to be had under 30c., and spelter is down to 15c., with fourth quarter delivery offered at 12.50c. Lead and sheet zinc have also declined. We quote: Casting copper, 28c. Lake copper, 29.50c.; tin, carloads, 49.50c., and small lots, 51.50c.; lead, 7.25c.; spelter, 15c.; sheet zinc, 24.50c.; Cookson's antimony, 50c.; other grades, 33c. to 37c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 23c.; copper bottoms, 21c.; copper clips, 21.50c.; red brass, 18c.; yellow brass, 13.50c.; lead pipe, 6c.; zinc, 12.50c.; pewter, No. 1, 29c.; tinfoil, 34c.; block tin pipe, 39c.

St. Louis

MAY 22.—Metals have been quiet, with an easier tendency in spelter. To-day's closing prices were as follows: Lead, 7.75c.; spelter, 18c.; tin, 53c.; Lake copper, 31c.; electrolytic copper, 30.50c.; antimony, Asiatic, 42c. In the Joplin ore district zinc blende declined and the range for 60 per cent was $65 to $100 per ton, with the average for the week's production of the district $86. Calamine ranged from $50 to $65, with the average for the week $55. Lead ore was off slightly, selling on a basis of $95 for 80 per cent. On miscellaneous scrap metals, we quote as follows, dealers' buying prices: Light brass, 10.50c.; heavy yellow brass, 13c.; heavy red brass and light copper, 16c.; heavy copper and copper wire, 20c.; lead, 5.75c.; tea lead, 4c.; zinc, 10c.; pewter, 25c.; tinfoil, 35c.

Great Northern Ore Properties in 1915

The ninth annual report of the trustees of the Great Northern iron ore properties shows that receipts in the year ending Dec. 31, 1915, were $1,131,976, against $877,959 in 1914 and $1,133,889 in 1913. Certificate holders received in the year $750,000, or 50c. a share. The total of undistributed receipts Dec. 31 was $4,126,298. Production from October, 1914, when the properties were turned over by the Steel Corporation, to Dec. 31, 1915, was 1,679,728 tons and shipments were 323,731 tons. The statement of estimated ore contents of the Great Northern properties shows a total of 299,282,144 tons of leased ore and 190,896,632 tons of ore not leased.

A conference on military truck specifications was held recently in New York City between members of the Society of Automobile Engineers and representatives of the United States Army. Out of it a committee has been organized with Coker F. Clarkson, general manager of the society, as chairman, to take up with Government officials detail data considered pertinent to standard specifications for gasoline motor trucks of 1½ tons capacity. One plan is to harmonize Government and commercial specifications and facilitate production and operation of motor trucks for the severe service of military campaigns.

STRIKES AND WAGE ADVANCES

Pittsburgh and Vicinity

All departments of the works of the Westinghouse Electric & Mfg. Company are now in practically full operation, the men who went on strike applying for their old positions as fast as they can be placed. The grand jury sitting in Pittsburgh last week examined a large number of witnesses of the riots at Rankin and Bessemer, and true bills were found against about 30 men. Fred W. Merrick, some years ago editor of a labor paper at Pittsburgh, but who was not an employee of any of the Westinghouse companies, was named as ringleader of the riots, and has been held on $30,000 bail for trial. He has already served several terms in jail for inciting riots in connection with labor troubles.

The main strike in the Pittsburgh district now is that of the molders, which has been on for nearly six months. They demand an 8-hr. day, with the same wage as for 9 hr., which employers have refused to grant. The strike of machinists is also continuing at a number of shops for an 8-hr. day with the same pay as for 9 hr. This demand has also been refused by the Employers' Association of Pittsburgh, which embraces practically all the machine shop operators. The number of machinists at work on a 9-hr. day in the Pittsburgh shops is steadily increasing, and it is believed that the men on strike will shortly see the futility of holding out longer.

Last week from 400 to 500 structural iron workers employed by the McClintic-Marshall Company, American Bridge Company, Lackawanna Bridge Company, Wright & Connelly Company and Pittsburgh Bridge & Iron Works, all of these concerns having structural jobs in the Youngstown district, went on strike, demanding 68.5c. per hr., against 60c. per hr., the present rate. This strike has tied up a large amount of structural work under way in the Youngstown district, including large new buildings and extensions to buildings for practically all the large steel companies there. It is expected that conferences will be held with the men this week with a view of adjusting the trouble.

At the works of the Republic Rubber Company, Youngstown, Ohio, about 700 men out of the 1100 that went on strike have returned to work.

The General Fireproofing Company, Youngstown, reports that all its men who went on strike are back at work, and the Trussed Concrete Steel Company, also at Youngstown, states that 750 out of 900 employees who went on strike have returned under the same wage and hour conditions as before.

The strike of the machinists in Youngstown is still on, but the men are gradually returning to work. Among the shops most affected are those of the William Tod Company and United Engineering & Foundry Company.

The Girard Iron Company, Girard, Ohio, has made a general advance in the wages of its employees. Under the new rate puddlers will be paid $7.42½ per ton, as compared with $7.40 paid by the Amalgamated Association puddlers under the recent readjustment. Finishers will be paid wages based on a 1.60c. rate card. Wages of laborers have been advanced from 22c. to 25c. per hr. and other employees receiving less than 30c. per hr. have been given a 3c. per hr. raise. About 1000 employees are benefited by the advance.

The strike of the molders at the plants of the Sharon Foundry Company and the Shenango Machine Company, both at Sharon, Pa., have been settled, and the men have returned to work. The men demanded an 8-hr. day with 9-hr. pay, but the two companies agreed to pay 50c. more for a 9-hr. day, which was accepted.

The New England Situation

The past week the strike of the fuse makers at the Ansonia Mfg. Company, Ansonia, Conn., developed into a serious riot, in which one man was killed and several others were injured. The strikers are of several nationalities, and while it has looked for a time as if there would be a settlement made, in every case some nationality has balked and the settlement plans have fallen through. Efforts to settle the strike have thus far failed.

At a meeting, May 21, the 2600 employees of the Fisk Rubber Company, Chicopee Falls, Mass., voted unanimously to accept a new offer made by the company on the day preceding. This offer was obtained from the company by Commissioner Frank M. Bump of the State Board of Arbitration and Conciliation. The men are granted an 8-hr. day, time and a half for overtime and double time for Sunday and holiday work. The 8-hr. day is granted without any loss in wages. The men first sought the recognition of the union, but in the final settlement it is agreed that a committee of employees, in place of the union committee, shall meet with the management and take up all questions of conditions and wages.

The strike of the wire workers at George W. Prentiss & Co.'s plant, Holyoke, Mass., has been declared off without any concession to the men.

About 200 employees, molders and laborers, of the Rhode Island Malleable Iron Works, Hillsgrove, R. I., have struck for an increase of 10 per cent in wages. Three weeks ago the company advanced the wages throughout the plant approximately 20 per cent.

The strike of a small number of men at the Benedict & Burnham plant of the American Brass Company shows no signs of spreading and it is probable that the trouble will be quickly adjusted.

About 20 employees of the roll-making department of the Holyoke Machine Works, Holyoke, Mass., are out, demanding a 20 per cent increase in pay.

In Greenfield, Mass., on the recommendation of the Citizens' Alliance, practically all metal-manufacturing concerns will immediately inaugurate a 9-hr. day or 54-hr. week. Each factory will make its own schedule, in some cases being affected by the trolley car schedules. Among the concerns to accept the recommendation are the Greenfield Tap & Die Corporation, F. E. Wells & Son Company, Greenfield Machine Company, Bicknell-Thomas Company and Bickford Machine Company.

The Bridgeport local of the International Association of Machinists has refused to sanction the walk-out of the 60 machinists of the Bridgeport Brass Company, claiming that the strikers refused to abide by a vote of the machinists in the plant, the majority of whom opposed the proposition to strike. The Marlin Firearms Company has granted a voluntary increase of wages of 15 per cent to its 700 employees.

The Thomas Smith Company, Worcester, Mass., maker of bolts and nuts, has given its workmen a 10 per cent increase in wages.

Conditions at Cincinnati

The labor situation in Cincinnati has eased up so that only a small number of plants are now suffering any inconvenience. The following statement includes two or three plants not previously reported:

Number of men at work April 29	13,862
Number of men at work May 19	13,145
Number of strikers who returned to work May 13 to 19 inclusive	350
Number of new men employed May 13 to 19 inclusive	373

One of the most valuable lessons learned by the employers in Cincinnati on account of this last strike is said to be that inexperienced men can be readily taught different branches of the machine-tool trade in a very short time. There has always been a reluctance on the part of superintendents to take on green men, but the results of the past few weeks have proved that it is not only possible but very practical to employ inexperienced men in various branches of the different metal industries. By careful supervision, these men develop in an amazingly short time into valuable workmen.

A canvass of quite a number of shops shows that they have a larger number of men on their payrolls to-day than on April 29, so that, as far as the local situation is concerned, the strike has proved a failure.

Gains have been made by employers in other nearby

centers, and there seems to be a general tendency on the part of all of them to resist demands for the 8-hr. day.

Wisconsin Developments

A conciliatory spirit displayed by organized machinists with respect to the action of 35 of the largest employers in the Milwaukee district, in placing the question of hours of work squarely before the Industrial Commission of Wisconsin for virtual arbitration, makes it appear at this time that the danger of serious labor trouble is past. While the expected organized demand for an 8-hr. day at the present wages never was actually presented to the employers, it has become known that on the same day that the employers addressed the commission the International Association of Machinists for Milwaukee and vicinity invited the commission to arrange a peaceable settlement of the hours of work question, which then seemed to be growing acute and threatened serious strike trouble. When the petition of the employers was made known by the commission to the organized machinists, they answered in a friendly spirit, stating "that the International Association of Machinists for Milwaukee and vicinity will forego, for the present, presenting its demands, and offers its co-operation in the conciliation, conditioned, however, that the investigation shall include the financial and industrial conditions of all the shops of the petitioning employers and others so as to ascertain not only the comparative but the real ability of the employers to meet the demands of the workers of Milwaukee who are members of our association, and that compulsory process for summoning witnesses be had, that the employers be compelled to produce their books and other evidence necessary to ascertaining all of the facts; that testimony be taken by examination and cross-examination, and that the transcript of the proceedings be had and preserved and the entire hearing be public."

Labor troubles in industries allied with the metal trades more or less intimately are rapidly being overcome. About 200 strikers at the automobile body and machine shop of the Charles Abresch Company, Milwaukee, have returned to work. The company abandoned its plan to maintain an open shop, which on March 1 caused the walkout. The matter was settled by arbitration alone.

The eleven sheet metal shops at La Crosse have signed a new agreement with members of the Amalgamated Sheet Metal Workers' Union, calling for a wage increase of 4.6c. per hr., and a reduction of the hours of work from nine to eight. The men had been receiving 33 1/3c. per hr.

Production of Lead in 1915

C. E. Siebenthal, of the United States Geological Survey, in a report just published, places the production of primary refined lead (lead smelted from ore) in the United States in 1915 at 550,055 net tons, against 542,122 tons in 1914, an increase of 7933 tons, or 1.3 per cent. He estimates the primary refined lead available for consumption in 1915 at 426,751 tons, against 449,052 tons in 1914, an increase of 5 per cent. The value of primary lead smelted or refined in the United States in 1915 he places at $51,705,000.

Coke Workers' Wages for 22 Years

The Connellsville *Courier* of May 11 prints a table showing wages of coke workers under the H. C. Frick Coke Company's scales from the time of the last strike in 1894 up to the recent advance on May 8. The figures show conclusively the heavy advances made in coke workers' wages in the past 22 years, there having been only two reductions in that period, one on Dec. 16, 1903, and the other on Jan. 1, 1908. They also show that wages of coke workers in the period named have more than doubled, and at present are much higher than ever before in the history of the coke trade. The figures, omitting some intermediate advances, are as follows:

Class of Work	Feb. 10, 1894	Jan. 1, 1903	Dec. 16, 1903	Mar. 1, 1907	Jan. 1, 1908	Jan. 16, 1910	Apr. 1, 1912	Feb. 1, 1916	May 8, 1916
Mining and loading room and rib coal, 100 bu.	$0.78	$1.35	$1.10	$1.35	$1.20	$1.35	$1.44	$1.58	$1.66
Mining and loading wet heading coal, 100 bu.	.88	1.50	1.25	1.50	1.38	1.50	1.58	1.73	1.85
Mining and loading west heading coal, 100 bu.	.95	1.55	1.30	1.60	1.50	1.62	1.70	1.86	2.00
Drawing coke, per 100 bu. charged	.43	.77	.63	.77	.70	.78	.82	.90	.95
Leveling, per oven	.08	.12¾	.10¾	...	.11½	.12½	.13¼	.14¾	.15
Drivers, rope riders (shafts and slopes)	1.65	2.50	2.20	2.55	2.40	2.60	2.85	3.05	3.20
Drivers, rope riders (drifts), full run	1.60	2.40	2.10	2.45	2.30	2.55	2.80	3.00	3.15
Cagers, per full run	1.65	2.50	2.20	2.55	2.40	2.60	2.85	3.05	3.20
Tracklayers, blasters and timbermen (shafts and slopes), per day	1.65	2.50	2.20	2.55	2.40	2.60	2.85	3.05	3.20
Tracklayers, blasters and timbermen (drifts), day	1.60	2.40	2.10	2.45	2.30	2.55	2.80	3.00	3.15
Assistant tracklayers and inside laborers, per day	1.35	1.97½	1.65	1.95	1.75	2.00	2.15	2.30	2.40
Dumpers and tipplemen, per full run	1.35	2.00½	1.68	1.95	1.80	2.00	2.15	2.30	2.40
Chargers, per oven	.03	.05	.04	.04½	.04½	.04½	...	...	...
Chargers, per day	1.40	2.00½	1.75	2.00	1.85	2.00	2.15	2.30	2.40
Forking cars, 40,000 lb.	.85	1.65	1.40	1.65	1.50	1.65	1.75	1.90	2.00
Forking cars, 50,000 to 60,000 lb.	.95	1.80	1.50	1.75	1.60	1.75	1.85	2.10	2.10
Forking cars, over 60,000 lb.	.75	1.65	1.60	1.90	1.75	1.90	2.00	2.15	2.25

Brown & Sharpe Making Citizens

A notable instance of the changing attitude of large employers toward the character of the men included in their working force is that of the Brown & Sharpe Mfg. Company, Providence, R. I., in establishing a policy of having its employees become American citizens. The first group of non-citizen employees of this company to make application for first papers was 34 men from its yard department. A recent canvass in this department showed that about eleven per cent of the 330 employees were not citizens. Nearly all of these men were included in this group which appeared before the United States Court on May 16. One of the foremen of the department was in charge of the men, and they were allowed full time for the time taken in applying for their papers. The company plans to carry out this work throughout the several departments of the plant.

The Sheet and Tin-Plate Scales

The Amalgamated Association of Pittsburgh closed its sessions in Cleveland, Ohio, last week with the making up of the scales for sheet and tin-plate mills that sign the Amalgamated scale, for the year starting July 1. A general advance of about 15 per cent in wages in the present sheet and tin mill scales is asked for in the new scales, and there have also been some important footnotes added to both the sheet and tin mill scales. It is recommended that the conference committee shall use its best endeavor to put in operation a 6-hr. work day.

A branch of the American Society of Marine Draftsmen has been organized in Baltimore, Md. The president is P. Nicholson; vice-president, H. F. Bennett; secretary, E. F. McDermott, Jr.; treasurer, G. K. Erdman; executive board, H. E. Krimmell, H. Hasenbalg and E. P. Keunne. The drafting departments of the Maryland Steel Company, Baltimore Shipbuilding & Drydock Company, Spedden Shipbuilding Company and Ellicott Machine Corporation were represented at the meeting.

Merchant vessels under construction in the United Kingdom at the end of the first quarter, March 31, 1916, were 424, according to Lloyd's Register. All but four of these were steamships, and the total gross tonnage was 1,423,435. These figures show an increase of four in number and of 59,845 in tonnage over the preceding quarter, but a decrease of 47 and of 164,032 in tonnage compared with the same quarter in 1915.

Pittsburgh and Nearby Districts

The Carnegie Steel Company has placed contracts for the installation of a Dwight-Lloyd sintering plant at New Castle, Pa., with a capacity of 350 tons of sinter per day, and also for a Greenawalt two-pan plant at its blast furnaces at Farrell, Pa., to have a capacity of 300 tons of sinter per day. For several years the company has operated a briquetting plant at Duquesne, near its Duquesne blast furnaces, and this is to be materially enlarged to take care of flue dust from the Edgar Thomson, Duquesne, Carrie and Clairton furnaces, the flue dust being briquetted into about 8-in. squares, which are used in the open-hearth furnaces at the Duquesne and Homestead works. The company is also going to build at Duquesne a Greenawalt five-pan sintering plant to take care of the tailings from the briquetting plant at Duquesne, and also the raw flue dust from the Carrie, Duquesne, Clairton and Edgar Thomson furnaces. When the additions to the briquetting plant are finished, it will have a capacity of 12,000 tons per month of briquettes, and the new sintering plant at Duquesne will have a monthly capacity of about 22,500 tons.

On Saturday, May 20, a number of leading officials of the Midvale Steel & Ordnance Company made an inspection of the blast furnaces, steel plants and finishing mills of the Cambria Steel Company at Johnstown, Pa. All expressed themselves as much pleased with the high physical condition of the works. W. E. Corey, president of the Midvale Steel & Ordnance Company, stated that it was the intention to make the Cambria works one of the largest single producers of steel in the United States, and this is taken to mean that additions to the open-hearth capacity are contemplated. In the inspection party were W. E. Corey, A. C. Dinkey, W. P. Barba, S. M. Vauclain, John D. Ryan, Ambrose Monel, John C. Neale, S. M. Pryor, Percy A. Rockefeller, M. H. Dodge, William B. Dickson, E. E. Slick, Frank A. Vanderlip, Powell Stackhouse, T. L. Chadbourne, Jr., William M. Bailey and R. Brewster.

The Best Engineering & Supply Company, Pittsburgh, has changed its name to Best & Co., being composed of George Best and his three sons. The firm has moved into new and larger quarters at Thirty-third and Railroad streets, where it has an equipment of modern machinery, with facilities for bending and fabricating pipe up to 30-in. in diameter and cutting and welding machinery and tools to machine valves and fittings up to 50-in. in diameter. George Best, the senior member of the firm, is one of the oldest founders in the Pittsburgh district, having for many years been president of Best, Fox & Co.

The Pittsburgh Coal Company has sold 192 acres of surface and coal land along the Monongahela River, near Pittsburgh, to the Clairton Land Company. It is understood that the latter company will supply coal to the new by-product plant of the Carnegie Steel Company at Clairton, Pa.

The Woodard Machine Company, Wooster, Ohio, which recently took over the Canton-Hughes Pump Company, is installing some new machinery in its plant and also building some special machines of a new type for gear cutting.

A slag crushing plant has been erected by the Standard Slag Company near one of the blast furnaces of the Brier Hill Steel Company, Youngstown, Ohio. The plant will produce about 15 carloads per day of crushed and screened slag used in road, roof work and concrete construction.

Notices have been issued by the East Ohio Gas Company, Youngstown, Ohio, to all manufacturers in northern Ohio now using natural gas for fuel in large quantities, that the special reduced rate will be increased June 1, and advising them to prepare for the discontinuance of the supply of gas entirely after Oct. 31. It is stated that this action was taken to insure a supply of natural gas for domestic consumers. Manufacturers have been getting gas at rates as low as 13c. per 1000 cu. ft., which will be increased June 1 to 14c. Domestic consumers have been paying 28 to 30c. per 1000 cu. ft. The shutting off of the natural gas supply will affect steel plants, sheet mills and some other large manufacturing consumers.

The liabilities of Josiah V. Thompson, former large coal and coke operator and president of the First National Bank of Uniontown, Pa., whose affairs were placed in the hands of a receiver over a year ago, are stated at $33,178,862.42 in a report prepared by W. G. Laidley, John P. Brennen and A. A. Thompson, receivers. The estate is valued at $65,714,305.99. The assets exceed the liabilities by $32,535,443.57.

No. 10 open-hearth furnace of the Brier Hill Steel Company, Youngstown, Ohio, was completed and started last week. The company now has a total of 10 basic open-hearth steal furnaces, with an estimated output of 560,000 tons per year.

The Purchasing Agents' Association of Pittsburgh held a banquet in the Fort Pitt Hotel last week. E. L. McGrew, Standard Underground Cable Company, presided, and J. H. Robison, United States Bureau of Mines, was toastmaster. Officers of the association are as follows: E. L. McGrew, Standard Underground Cable Company, president; G. D. Leopold, Kennedy-Stroh Corporation, vice-president; Robert McMillan, Pittsburgh Steel Company, second vice-president; E. H. Ridgway, Colonial Steel Company, treasurer; H. E. Harmon, Des Moines Bridge & Iron Works, secretary. Other directors are: W. B. Greer, Wheeling Corrugating Company; D. A. Neff, Petroleum Iron Works Company; E. S. Cox, R. K. Carter & Co.; H. A. Grusch, United Engineering & Foundry Company; F. H. Allison, American Vanadium Company; F. C. Yeates, Cambria Steel Company; J. F. Stauffer, A. M. Byers Company; C. W. Lepper, Pittsburgh Railways Company, and R. F. Blair, Pittsburgh Gage & Supply Company.

Stowell Mfg. & Foundry Company Reorganized

The Stowell Company, a new corporation with a capital stock of $200,000, will take over the Stowell Mfg. & Foundry Company, South Milwaukee, Wis., which has been operating under Frederick L. Sivyer as trustee since March 1, 1913. The manufacture of malleable iron castings will be continued, and chain belts will be added to the line of products. In recent months business has picked up to a remarkable extent and returned the plant to a profitable basis. Officers have been elected as follows: President, Fred W. Rogers; vice-president and general manager, Rupert A. Nourse; secretary, Douglas A. Parmentier; treasurer, Thomas E. Ward; directors, Frederick L. Sivyer, W. F. Meyers and Thomas H. Spence. The mortgage on the plant will be liquidated in full at once and the new company will start with a clean bill of health. Mr. Nourse, the general manager, is head of the Schartow Mfg. Company, saddlery hardware.

The Goodyear Tire & Rubber Company, Akron, Ohio, states that its output of pneumatic truck tires is steadily increasing. The company was the pioneer in introducing a big pneumatic tire for trucks. Large fleets of trucks are now mounted on pneumatic equipment. "Not only are these big tires proving their worth by providing greater cushioning and freedom from tire trouble," says the company, "but they greatly reduce repair expense, and increase the life of the truck. When we first introduced them their appeal was largely to truck owners hauling perishable or breakable goods, but so apparent have been their advantages that trucks in all classes of service are now using them.

A plan for awarding cash prizes to employees of the Cambria Steel Company who offer the best suggestions for improvements in the output and working conditions in the plant, has recently been authorized by E. E. Slick, vice-president and general manager. Nine suggestion boxes have been placed at convenient places in the entrances to buildings where the written suggestions may be dropped. The highest prize is $30 and the lowest is $10, the total monthly distribution being $110. All employees are eligible to compete.

OBITUARY

CLOUD C. CONKLING, chief civil engineer of the Lackawanna Steel Company, died May 8, aged 53 years. He was born in Rensselaerville, N. Y., spent his boyhood days at Scranton, Pa., and was educated in the public schools of that city. He continued his studies, including civil and mining engineering, and took a special course at Williston Seminary, East Hampton, Mass., in 1882 and 1883. In 1884 and 1885 he was employed in an engineering office at Scranton, and entered the department of civil and mining engineering of the Lackawana Iron & Steel Company in 1886, as rodman, continuing with that company, now the Lackawanna Steel Company, in various capacities. He had entire charge, for the first year and a half, of the construction of the company's plant at Buffalo, and was chief engineer of the company up to 1904, at which time he left its direct employ to engage in practice as consulting civil engineer at Buffalo. In 1907 the original design of Lackawanna steel sheet piling was patented. Mr. Conkling designed and patented modifications of the original, and was instrumental in bringing to a successful completion the designs and sections of piling now rolled by the Lackawanna Steel Company, also advising with engineers on many important projects in which this material was used. In October, 1913, the consulting work of this character had reached such a magnitude that Mr. Conkling returned to the company as chief engineer in the steel sheet piling engineering department, which position he held until the time of his death.

DR. ELMER L. CORTHELL, an engineer of international reputation and president of the American Society of Civil Engineers, died in Albany, N. Y., May 16, aged 76 years. While many of the notable bridges of the country are of his design and he was also conspicuously identified in river and harbor work, a distinctive feature of Dr. Corthell's practice was its varied character and in particular the large projects, involving large sums of money, given over to his charge. His name is associated with the Tehuantepec Railroad of Mexico and the Tampico harbor improvements, Mexico, and he investigated some thirty-six subjects for the Argentine Republic, besides representing that country at the International Navigation Congress at Dusseldorf in 1902. He planned and was chairman of the International Engineering Congress of the Columbian Exposition and was active indeed in the recent Pan-American Scientific Congress in Washington.

WILLIAM STANLEY, prominent as an inventor who contributed largely to the development of the electrical industry, died at his home in Great Barrington, Mass., May 14, aged 58 years. He was best known because of his invention of the electrical transformer and the alternating-current system of lighting and power transmission which forms the basis of all long distance distribution of electric current. Mr. Stanley left Yale University before completing his course in order to take up practical experimental work in the then new industry. He was chief engineer of the Westinghouse Electric Company from 1885 to 1888 and was later head of the Stanley Electric Mfg. Company and the Stanley Instrument Company. His position in the electrical industry was recognized by the granting of the Edison medal. He was a member of many American and foreign technical societies.

AMBROGIO NECCHI, a prominent Italian foundryman, died at his home in Pavia, Italy, April 18, after a long illness. He was born Jan. 2, 1860, and succeeded to his father's foundry business. His technical education, combined with the fact that he possessed business ability, enabled him to give such an impetus to the business that it is now regarded as the most important foundry in Italy and employs 2000 men. It was the first Italian plant to develop successfully the manufacture of cast-iron radiators, gilled pipes so-called and other heating specialties. In 1907 a stock company with a capital of about $1,300,000 was organized which developed the malleable and steel foundry departments, the latter using open-hearth and electric furnaces. Following this a plant was built for the manufacture of cast-iron bathtubs, washstands and other enameled ware.

JOSEPH TATNALL LEA, long prominent in the iron trade of Philadelphia, died in that city May 12, aged 77 years. He engaged in business for himself in 1874. On the death of his father-in-law, Robert Cabeen, Mr. Lea took over the business which the former had established and in 1882 organized the firm of J. T. Lea & Co. to conduct a business in pig iron, coke, coal, etc. For many years Mr. Lea was actively engaged in many enterprises and for a time was first vice-president of the Lake Superior Corporation and of its subsidiary, the Algoma Steel Company. He withdrew from active business a few years ago.

W. H. CLARK, Salem, Ohio, senior member of the W. J. Clark Company, maker of sheet-metal products, died May 13, aged 96 years. He was born in Canandaigua, N. Y., and located in Salem in 1872 when, with his son, W. J. Clark, he established a sheet-metal manufacturing plant under the name of Kittredge, Clark & Co. Five years later Mr. Clark and his son withdrew from this firm and established the present W. J. Clark Company. Despite his advanced years he was able to remain at his desk until a few days before his death.

OLIVER B. NIEDRINGHAUS, superintendent of the National Enameling & Stamping Company at Granite City, Ill., died at his home in St. Louis, May 20, after an illness of about a year. He left his widow and one daughter. He was a member of the board of directors of the company, and also a director of the Granite City Gas, Light & Fuel Company, Granite City National Bank, Granite City Realty Company and a member of several of the most select clubs of St. Louis.

EDWARD C. HARRISON, for 14 years chief engineer at the Granite City plant of the Commonwealth Steel Company, died of apoplexy in the company's office in St. Louis, May 11, aged 56 years. He leaves his widow and two sons.

Tar and Tar Oil as Diesel Engine Fuel

At the February meeting of the Diesel Engine Users' Association, England, W. Batho, British representative of Sulzer Brothers, Winterthur, Switzerland, gave some particulars of tar oils and tars suitable for use as fuel in Diesel engines. Almost all the heavy oils can be used, according to the report of his remarks in London *Engineering*, although a certain amount of crystallization occurs in some of them after storage in cold weather. Heating the oil would usually dissolve the crystals readily, and this should be done, as they contain elements of high fuel value.

The minimum calorific value varies from 15,800 to 16,500 B.t.u. per pound and the flashpoint from 70 to 130 deg. Fahr., it being considered undesirable from the point of view of safety against fire to employ oil having flashpoints below 100 deg. When dropped on white paper the oil should spread without leaving any black residue, indicating a large percentage of free carbon or other tar ingredients. These residues only begin to vaporize at about 400 deg. C. and lead to a considerable amount of deposit in the engine cylinder, thus necessitating frequent cleaning and grinding in of the exhaust valves. The amount of ash or water present does not exceed 1 per cent in either case, and the sulphur content should range between ½ and 1 per cent.

Compensation as a problem of management is to be discussed at a meeting of the Efficiency Society, Thursday evening, May 25, at the Advertising Club, 47 West Twenty-fifth Street, New York. E. J. Frost, vice-president William Filene's Sons Company, Boston, will cover profit-sharing, and Robert T. Kent, consulting engineer, will devote himself to bonuses and premiums.

PERSONAL

Edward M. Hagar, formerly president of the Universal Portland Cement Company, recently accepted the presidency of the Wright Company, manufacturer of aeroplanes and motors, and has given up for the time being his cement project. Mr. Hagar is also president of the Simplex Automobile Company, with plant at New Brunswick, N. J., and several allied concerns.

Dr. Joseph Struthers, formerly secretary of the American Institute of Mining Engineers, has become treasurer of the Federal Export Corporation and the Federal Shipping Company, Inc., 111 Broadway, New York. The Federal Export Corporation, by reason of its affiliation with the Federal Shipping Company, Inc., as its shipping agent, and with Raymond, Pynchon & Co. as its financial agent, can arrange to make deliveries c.i.f. France or other foreign countries, and pay for them f.o.b. mill in the United States or f.a.s. New York, a combination which has obvious advantages in the present difficult shipping situation.

P. J. Ford has resigned as buyer and department manager for Crerar, Adams & Co., Chicago, with whom he has been associated for over 30 years, and has organized the P. J. Ford Company, with office and store at 619-621 West Washington Street, Chicago, acting as district sales agent for several well-known manufacturers. Mr. Ford is president and treasurer of the new company.

G. W. Bickerton has been appointed chief draftsman of the Youngstown Sheet & Tube Company, Youngstown, Ohio, to succeed L. Thomas, resigned, and C. O. Weissenburger has been appointed assistant to the chief engineer.

H. T. White is now representing the Modern Tool Company of Erie, Pa., in the Detroit territory, with offices at 248 Gladstone Building, Detroit, Mich. Mr. White, who succeeds R. C. Douthitt, is a thoroughly practical mechanic, having for a number of years been tool superintendent at the works of the company, previous to which time he traveled in the West with the same line.

D. T. MacLeod, consulting engineer, has opened an office at 50 Pine Street, New York City. For the past 16 years he has been connected as chief engineer with the United Coke & Gas Company, American Coke & Gas Construction Company and Otto Coking Company. He will specialize in the design and construction of by-product coke-oven plants.

Robert Garland, of the Garland interests at Pittsburgh, has been elected president of the Pittsburgh Chamber of Commerce. He is also one of the nine city councilmen.

Thomas W. Murray has resigned as assistant manager of sales of the Trussed Concrete Steel Company, Youngstown, Ohio, to become general sales manager of the United Fuel & Supply Company, Detroit, Mich.

W. H. Coggswell, 2329 Oliver Building, Pittsburgh, has been appointed representative in the Pittsburgh district for the Gromwall-Dixon electric steel melting and refining furnaces. He was for seven years with the General Electric Company.

William Smith, master mechanic of the Steelton plant of the Pennsylvania Steel Company, has resigned, effective May 20. The position will remain open for the present. Mr. Smith went to Steelton three years ago from the Jones & Laughlin Steel Company, Pittsburgh.

W. J. Stoop has been appointed superintendent of the Wilmington Steel Company, Wilmington, Del., recently acquired by the Midvale Steel & Ordnance Company.

Arthur W. Taylor, for several years superintendent of the open-hearth department of the Gulf States Steel Company at Gadsden, Ala., has accepted a position as metallurgist with the Jones & Laughlin Steel Company, Pittsburgh. L. R. Luckie succeeds Mr. Taylor as open-hearth superintendent at Gadsden, and A. W. Liles has been appointed superintendent of the blooming mill.

L. C. Curl, for many years purchasing agent for the Buda Company, Harvey, Ill., has resigned to become purchasing agent for the Continental Motor Mfg. Company, Muskegon, Mich.

C. J. Bambach, associated for a number of years with the Marshall & Huschart Machinery Company, Chicago, has become vice-president of the recently organized Pierce Machine Tool Company of that city.

Thomas C. Doolittle, who has been assistant secretary of the Cleveland Chamber of Commerce for several years, has resigned to become secretary of the Horsburgh Forging Company, Cleveland, Ohio.

Charles L. Foster, formerly manager of the Akron district for the Westinghouse Electric & Mfg. Company, has taken charge of the sales department of the Electric Furnace Company of America, Alliance, Ohio, under the title of manager of sales. Mr. Foster has had a long experience in the electrical line, having been for 13 years with the Westinghouse Company.

H. G. Mead, formerly with the old house of Henshaw, Bulkley & Co., and recently with the Pacific Tool & Supply Company, is now with Fred Ward & Son, San Francisco, in charge of the machine-tool department.

Henry M. Cleaver, who for some years has been advertising manager of the Niles-Bement-Pond Company, 111 Broadway, New York, is now located at the Pond works of the company, Plainfield, N. J., to the affairs of which he will devote himself exclusively in the future. The advertising department is under the management of D. M. Crossman, heretofore assistant advertising manager.

D. M. Caird, of the Manchester office of Charles Churchill & Co., Ltd., London, England, sailed for England May 20. He had been in this country ten weeks looking after shipments of machine tools to Great Britain. He says that shell production is proceeding rapidly in the manufacturing sections of England, and that great stocks are being accumulated, largely with the assistance of women as machine operatives.

Ernest S. Cox has arranged to terminate on July 1 his services as Pittsburgh manager of R. K. Carter & Co., buyers for jobbers of hardware, iron, steel, machinery, etc.

S. Naganuma has opened an office at room 1042 Equitable Building, 120 Broadway, New York, as representative of Mitsubishi Goshi Kaisha, doing a large mining and ocean shipping business in Japan.

British Honors for Americans

Awards of Carnegie Research Scholarships for 1915 were announced at the recent meeting of the Iron and Steel Institute, May 4, in London. Out of applications from eleven candidates, four scholarships for one year of a value of £100 each were awarded as follows:

T. G. Thompson, Seattle, Wash.
E. L. Dupuy, Paris.
J. A. N. Friend, Worcester, England.
W. D. Helderman, Utrecht, Holland.

Further grants of £50 each were made to:

H. M. Boylston, Cambridge, Mass.
H. B. Cronshaw, Cambridge, England.

The Andrew Carnegie gold medal for 1914 was presented to Eugène Nusbaumer of Paris for his researches on the testing of materials.

The Indiana Appellate Court, in a decision just rendered, says that where the officers of a corporation participate in promoting a fund for inducing new companies and enterprises and business in the town and subscribe to the fund in the name of the corporation, the corporation is required to pay the amount of the subscription. The case was that of the Huntington Factory Fund Association, Huntington, Ind., against a local company.

Machinery Markets and News of the Works

DEMAND IS NORMAL

Occasional Order for Munitions Work

Single-Tool Buying Predominates—Cancellations Are Few and Have Inflicted No Injury—Some Prices Are Reduced

The demand for machinery in every part of the country has assumed a normal, healthy aspect with which the trade is well satisfied. It is a notable fact that it views with little regret the passing of the panicky war buying. Deliveries of standard machine tools are somewhat easier to obtain, though it is still necessary to wait several months for some types. Prices are adjusting themselves to the saner conditions, especially those of machines placed on the market in recent months. In New York there have been a few cancellations, but tools not taken by original purchases have been soon disposed of elsewhere.

The American Locomotive Company has taken a new fuse order, part of which will be sublet. Another echo of war business comes from Cleveland, where there has been inquiry for small lots of lathes to be used in the manufacture of high-explosive shells, while Cincinnati also reports a little war business.

Labor trouble is again threatening in northern New Jersey, the unions having renewed their demand for an 8-hr. day, which most of the machinists do not want. What they are looking for is more money, and the employers already have made concessions in this regard.

Most of the demand in Cincinnati is for single tools, but it is good in the aggregate, especially that coming from the auto-truck and automobile makers. Munitions makers are placing occasional orders for special machines. The foreign demand in Cincinnati is slow.

The Malm Machine Company, Dayton, Ohio, recently incorporated, is to operate a plant for the manufacture of rotary punching presses.

Railroad buying is not active, either in the East or West.

The Davies-Mitchell Engineering Company, Cleveland, Ohio, has been organized and will begin the erection of a plant in about ninety days for the manufacture of automobile motors. The Timken Roller Bearing Company, Canton, Ohio, has placed contracts for two large buildings in addition to construction work recently announced.

In New York the Federal Bearings Company, capitalized at $1,000,000, will take over the ball-bearing business of the Schatz Mfg. Company, Poughkeepsie, N. Y. It will erect a plant adjoining that of the Schatz Mfg. Company.

In Michigan, as the Detroit market discloses, there are many large and important factory additions under way. The Springfield Metal Body Company, Detroit, has acquired 27 acres as a site for a new plant and will shortly begin the erection of a building containing 500,000 sq. ft. of floor space.

The Maxwell Motor Company has let a contract for the structural steel work required for its new plant addition at Newcastle, Ind., which will cost about $300,000 for new buildings and equipment. The Lawnsdale Mfg. Company, Elkhart, Ind., has secured factory space for the manufacture of automobile parts.

Never before has the Pacific coast experienced such a shipbuilding boom as it now has. Plants, new and old, are working to capacity. Several new shipbuilding projects have been delayed because of the scarcity of material.

F. C. Kramer, Savannah, Ga., will shortly begin the erection of a factory for the manufacture of commercial automobile bodies and automobile wheels.

Canada continues active. The Russell Motor Company, West Toronto, has purchased 28 acres near Weston, Ont., where it will erect a plant for the manufacture of bicycles and skates.

New York

NEW YORK, May 23, 1916.

The demand for first-class machine tools which can be had on reasonable delivery continues steady, and the situation can be summed up by saying that a normal, healthy business is being done. Prices are gradually adjusting themselves to existing conditions, particularly for those tools whose builders engaged in the business since the war started. Prices have been shaded in some instances also by makers of standard machines. A few cancellations of orders have come to light involving munitions makers whose deliveries are so far behind that their contracts have been reduced in size.

The railroads continue to hold off in buying, and not much is being done by the Government, although the Brooklyn Navy Yard is taking bids on a small list, on which estimates are to be submitted by May 29.

Manufacturing plants in New Jersey and Pennsylvania are filled with work, but practically the only equipment they are buying is for rounding out their facilities. In northern New Jersey labor trouble is again threatening, the unions having renewed their demand for an 8-hr. day. So far, however, in practically all of the shops the men have remained at work. At Elizabeth, N. J., twelve machinists were arrested May 19 for standing outside the windows of the Singer Mfg. Company and endeavoring to call out the employees. In court the trouble makers were discharged after a warning.

Gould & Eberhardt, Newark, N. J., makers of shaping and gear cutting machines, who have been in the market for tools are proceeding with their new plant. Bids are being taken for the structural material required.

Russian interests continue the best foreign buyers, although they are less active than they were a few weeks ago.

The Street Cleaning Department of the City of New York has invited bids for the following machines, bids to be submitted to the commissioner of the department, Municipal Building, New York:

One Putnam 18 x 36-in. motor-driven gap lathe with full equipment.

One Monarch 14-in. x 6-ft. motor-driven engine lathe, complete.

One Barnes motor-driven 22-in. sliding head drill press.

One Robertson motor-driven hack saw.

One No. 2 Garvin universal motor-driven milling machine.

One Barnes motor-driven water emery grinding machine.

One motor-driven air compressor, running 225 r.p.m., 7½ to 10 cu. ft. per min.

One Barnes 30-in. x 36-in., 50-ton screw press.

The American Locomotive Company has obtained an order for 2,200,000 time fuses from the British Government to a total value of about $9,000,000. The contract specifies that deliveries shall be completed by the end of this year. The order will be sublet, part going to the Nathan Mfg. Company and the rest to the Westinghouse Air Brake Company. The assembling of the fuses will be completed by the American Locomotive Company. Three new concrete and steel additions to the Schenectady plant of the American Locomo-

tive Company will be built, primarily to relieve the congested condition prevailing in the shops. These will be a cylinder shop, 175 x 300 ft., an addition to the iron foundry, 100 x 175 ft., and a paint and oil storehouse, 45 x 65 ft. Also a two-story wing, 55 x 230 ft., to the iron foundry, will be built, to be used as a cleaning room for castings. It will have a ground floor used for core ovens, sand mixing, repairing of foundry flasks and foundry storage. The second floor will be fitted up with a foreman's office, lavatories, baths, locker room and corebox storerooms. The crane runway of the foundry building will be extended into the yard 200 ft. for storing cylinder flasks. The brass foundry will be located in the 100 ft. extension to the iron foundry.

The Lefever Gun Company, Ithaca, N. Y., which has taken over the gun-making business of the Lefever Arms Company, Syracuse, N. Y., is now erecting a building and plans to erect additional buildings to produce double the previous output of Lefever guns. It will manufacture about 5000 this year. The incorporation of the company has not yet been completed, and the company is known for the time being as the Lefever Arms Company, Gun Department, Ithaca, N. Y.

The Federal Bearings Company, capitalized at $1,000,000, will take over the manufacture of high-grade ball bearings formerly manufactured by the Schatz Mfg. Company, Poughkeepsie, N. Y. One executive force will operate both companies. The Federal Company will start the erection at once of a three-story factory, 60 x 140 ft., to cost about $75,000, and to contain equipment costing about $100,000. The Schatz Company will still continue its manufacture of commercial-grade ball bearings, hardware specialties, casters, sheet-metal stampings and steel balls. About 200 men will be employed in the new plant. H. A. Schatz is treasurer.

Permits for the construction of industrial plants for chemical refining and metal works which call for the expenditure of $249,000 were the principal items in a recent report of the building department of Newark, N. J. The Picher Lead Company, Joplin, Mo., will erect a four-story brick building, 61 x 666 ft., and a one-story brick building, 61 x 195 ft., at the foot of Blanchard Street, at a cost of $160,000. The Seaboard Chemical Company will expend $35,000 for the construction of a four-story concrete refinery, 39 x 73 ft., a boiler house and storage building. John Campbell & Co. will erect at Plum Point Lane and the New Jersey Central Railroad a brick warehouse, 35 x 100 ft., a brick laboratory, 25 x 85 ft., and two brick factory buildings, each 50 x 100 ft., and a powerhouse, 50 x 100 ft., costing $36,900; and the Balbach Smelting & Refining Company a steel copper blast furnace, 47 x 84 ft., at Avenue R and Doremus Avenue, to cost $7,000.

The Endicott Forging & Mfg. Company, Endicott, N. Y., will shortly issue $25,000 of increased capitalization which has been authorized. It is now building an office building, a fireproof forge department, a hardening room and a powerhouse. Its forge department is being equipped with a 5-ton Shepard Giblin type crane which connects with runways in the steel yard. In the powerhouse it is adding a Stumpf Unaflow engine, 19 x 22, a 150-kw. heavy-duty, also a 150-kw. 125 and 250-volt direct current generator, and is installing another 2500-lb. Bliss board drop and 75½-ton geared press.

The Mey Chain Belt Company, Buffalo, has been incorporated with a capital stock of $10,000 to manufacture chains, belting, hoisting machinery and motors; and will take over and operate the plant of the Mey Chain Belt Works at Washington and Perry streets. H. F. and K. H. Mayer are the incorporators.

The General Castings Corporation, Buffalo, has filed articles of incorporation with E. L. Stutt, B. S. Linelty and W. H. Means, Marine Bank Building, as directors.

The North Buffalo Hardware Foundry Company, Buffalo, is building an addition to its foundry at the Erie Railroad and Bridgemen Street.

Work has been commenced by the Monarch Engineering Company on construction of a movable marine tower to be added to the Connecting Terminal Elevator, Blackwell Canal, Buffalo. The tower will be 159 ft. in height, and will operate on four tracks, with a capacity of handling 25,000 bushels of grain per hour. It will cost $100,000 and is to be completed in 30 days.

The Ferguson Steel & Iron Company, Buffalo, is building a further steel frame addition to its fabricating plant at Bailey Avenue and the New York Central Railroad.

The Donner Steel Company, Buffalo, has commenced work on a steel and iron stock-house to be added to its plant at Abbott Road and the Lackawanna Railroad.

The Harlem Valley Light, Heat & Power Company, Pawlings, N. Y., has been incorporated with a capital stock of $150,000 to manufacture electricity. A. F. Griffing, G. F. Green, Danbury, Conn., and G. Whittlesey, 130 East Sixty-seventh Street, New York, are the incorporators.

The Marine Propeller & Engine Company, Troy, N. Y., has been incorporated with a capital stock of $50,000, and will equip a plant to manufacture marine engines, propellers, boats, etc. L. M. Foster, Norwich; W. S. Newton, Cropseyville, and J. W. Reddy, Troy, N. Y., are the incorporators.

The Strong Steel Foundry Company, Buffalo, is adding a pattern building 50 x 50 ft., two stories, to its plant at Hertel Avenue and the Erie Railroad.

The Davidson Gasoline Process Company, Buffalo, has filed articles of incorporation with a capital stock of $100,000 to manufacture petroleum products by a patented process. J. W. Ellis, Morgan Building, W. H. Kelley and M. Lentz, Buffalo, are the incorporators.

The Buffalo General Electric Company, Buffalo, is building a two-story addition to its sub-station at Niagara and Ontario streets, and the Erie Canal, to cost $22,000.

William Higginson, 21 Park Row, New York, has completed plans for a four-story brick and reinforced concrete factory building, 100 x 230 ft., at the northeast corner of Anabel Avenue and Creek Street, Long Island City, for the Degnon Realty & Terminal Company, 30 East Forty-second Street, New York, for the Kindel Bed Company, Chicago, Ill., lessee, to cost $125,000.

Plans have been prepared for a four-story brick and steel factory building, 154 x 300 ft., on Fourteenth Street, Harris Avenue and Ely Avenue, Long Island City, for Frederick Ayer, 141 Milk Street, Boston, Mass. J. O'Dell Whitenack, 231 West Eighteenth Street, New York, is the general contractor. The cost will be about $250,000.

W. W. Bosworth, 527 Fifth Avenue, New York, has completed plans for a two-story brick factory, 50 x 200 ft., on Vernon Avenue, Long Island City, for the Welin Marine Equipment Company, 305 Vernon Avenue.

The Newark Factory Sites, Inc., sold to the North American Copper Company, 52 Vanderbilt Avenue, New York, a large tract of land on the Newark meadows having a frontage of 690 ft. on the Hackensack River, extending back to Hackensack Avenue and embracing over ten acres of land. It is stated that plans for the improvement of the property are now being prepared, and construction will be started as soon as they are completed. It is understood to be the purpose of the company to manufacture here much of its metal products intended for export.

Philadelphia

PHILADELPHIA, PA., May 22, 1916.

The Lycoming Foundry & Machine Company, Williamsport, Pa., has had plans drawn by F. Arthur Rianhard, Masonic Building, Williamsport, for a one-story assembling shop, 100 x 250 ft., to cost about $20,000. The architect is taking bids.

The Purites Company, 15 William Street, New York, will take bids May 24 for a one-story factory, 69 x 76 ft., to be erected on its new plant site near Chester, Pa., and to cost about $29,000. A. D. Ledox is in charge.

The Atlantic Refining Company, R. D. Leonard, 3144 Passayunk Avenue, Philadelphia, in charge, is about to start the construction of a two-story boilerhouse, from private plans. It will be 75 x 99 ft., and 30 x 30 ft., and will cost about $31,000.

A. G. Fisher is taking revised bids for the construction of a two-story shop and garage, 45 x 110 ft., to be erected at 4947 Fairmount Avenue, Philadelphia, at a cost estimated to be $40,000.

H. S. Souder, manufacturer of cigar boxes and lumber, Souderton, Pa., has had plans drawn by Jerome S. Landes for an engine and boiler house.

The Quaker City Rubber Company, 629 Market Street, Philadelphia, has awarded contract to S. S. Wilmer, 3211 Comley Street, Philadelphia, for the erection of a machine shop addition, one story, 32 x 151 ft.

The Pringle Electric Mfg. Company, 1906 North Sixth Street, Philadelphia, has awarded contract to Harry Gill, Jr., 2505 Germantown Avenue, for the erection of a three-story brick addition to its plant.

The American Viscose Company, Marcus Hook, Pa., has let contract to William Provose, Jr., Chester, Pa., for a powerhouse, which is the first unit to be constructed, according to plans by which the company, it is said, will double its plant.

The Chester Shipbuilding Company, Chester, Pa., following action of the Chester street commissioners, who have closed Front Street to the low-water mark of the Delaware River for 20 years, will now exercise an option on property on Parker Street, opposite its plant. With this additional land the company will have 25 or more acres, or more than twice its present site.

The Lancaster Edge Tool Company, Strasburg, Pa., has been incorporated with a capital stock of $20,000 by S. B. Futer, Leacock Township, Pa.; S. F., Isaac K. and Ira K. Swelgart, Strasburg; William Wilkinson and Joseph Wilson, Lancaster, Pa., to manufacture edge tools, novelties and small hardware.

The Lackawanna Boiler & Grate Company, Scranton, Pa., has been incorporated with a capital stock of $10,000 by Edward Kippax and Frank Silliman, Philadelphia; Edward A. Weldt, Scranton, to manufacture and install steam boilers, furnaces and accessories.

New England

BOSTON, MASS., May 22, 1916.

The embargo situation on the New Haven lines shows but little change. The embargo against Hartford has been lifted but South Norwalk and New London, Conn., have been added to the restricted points. From time to time special embargoes against specific concerns are put in force or are lifted as their capacity for taking care of freight changes. Labor troubles at East River piers made it necessary to put on a temporary embargo against freight destined for the piers affected. The situation is somewhat better than it was a week ago and everyone is looking forward to further modifications of the embargo immediately.

The Bristol Brass Company is understood to have plans for the construction of an additional factory, 60 x 300 ft., which will be used mostly for its brass tube and rod business.

The new addition to the Beaton & Cadwell Company plant at New Britain, Conn., will be 50 x 120 ft., six stories, with a boiler house added.

The North & Judd Mfg. Company, New Britain, Conn., is contemplating an addition to its plant.

Sleeper & Hartly, Inc., Worcester, Mass., has leased an additional space, 50 x 75 ft., in the basement of the Robinson Building, 68 Prescott Street, in addition to its present space. It will move its heavy machines from the first floor to the basement and install lighter machinery on the first floor.

The New Departure Mfg. Company, Bristol, Conn., has bought 17 acres of land to be used for the building of individual, low-priced cottages for workmen.

The Duckworth Chain & Mfg. Company, 41 Mill Street, Springfield, Mass., has had plans drawn for an addition, 60 x 60 ft., one story.

The Safety Lock Company, Brockton, Mass., has been incorporated with a capital stock of $50,000 by Anthony Giardino, president; Liboria G. Giardino, treasurer, and Joseph Giardino.

The Anderson-Hays Motor Company, Portland, Maine, has been incorporated with a capital stock of $100,000. Eben W. Freeman, president; Charles M. Drummond, clerk; and Henry A. Peabody, are the incorporators.

The Maxim Silencer Company, Hartford, Conn., is building an additional two-story factory, 64 x 110 ft. The new addition will enable it to double its working force of 130 men.

The Hampden Machine & Tool Company, Springfield, Mass., has been incorporated with a capital stock of $20,000. The directors are O. L. Johnson, president; William L. Connery, treasurer, and C. R. Molin.

The Parmenter Mfg. Company, Boston, Mass., has been incorporated, with capital stock of $50,000, to manufacture nut and pipe wrenches. The directors are George A. Parmenter, president; H. M. Chase, treasurer; and W. N. Benson.

The Burrill Tire Tool Company, Concord, Mass., has incorporated with capital stock of $200,000. The directors are: George Noll, treasurer; Edward F. Loughlin and F. H. Burrill.

The Connecticut Alloyed Metals Company, Bridgeport, Conn., has begun the erection of a factory, 45 x 125 ft., one story, on Stratford Avenue, Stratford, Conn.

The DeNevers Typewriter Company, Boston, Mass., has been incorporated with a capital stock of $100,000. The directors are S. B. Blunt, president; Emil L. Loeb, treasurer, and H. B. Crosby.

The Standard Company, Torrington, Conn., is having plans drawn for an addition, 50 x 300 ft., four stories. This addition will be used for the expansion of all departments of the plant.

The Norton Company, Worcester, Mass., has awarded a contract for a bonding building, 116 x 133 ft., one and three stories.

The Chase Metal Works, Thomaston Avenue, Waterbury, Conn., has secured a permit to erect a two-story brick and steel addition.

The Providence Engineering Works, Providence, R. I., recently agreed with the British Government, through J. P. Morgan & Co., to cancel a contract it had for Serbian shells, due to the fact that there is no longer a demand for these shells. The company is now disposing of the machinery used in connection with this contract.

Baltimore

BALTIMORE, MD., May 22, 1916.

A brick building, 12 x 60 ft., will be constructed on Key Highway near Montgomery Street, Baltimore, for McIntyre & Henderson, engineers and boilermakers, Key Highway and Warren Street. The contract has been awarded to the Consolidated Engineering Company, Calvert Building.

The New Era Elevator & Machine Company, 111-113 Grant Street, Baltimore, will erect a one-story addition, 40 x 70 ft., to its present plant.

Contract for the shipways and foundations for the new Sun Shipbuilding Company, Chester, Pa., has been awarded to the Raymond Concrete Pile Company, 90 West Street, New York City.

The carpenter shop of the Philadelphia, Baltimore & Washington Railroad at Clayton, Del., was destroyed by fire on May 17.

The Maryland Glass & Mirror Company, Baltimore City, has been incorporated with $10,000 capital stock by Howard Bryant, 112 East Lexington Street, Baltimore,; Charles H. Miller and Emil O. Walter. It has leased the property at 416 East Saratoga Street and will manufacture mirrors.

The Baltimore Copper Smelting & Rolling Company, Fourth Avenue and Fifth Street, Canton, Md., is planning the construction of a brass mill. No announcement has been made.

While no official announcement has been made it is understood the Curtis Bay Chemical Company, Curtis Bay, Md., plans the construction of several new buildings to cost about $1,500,000.

The Maryland Steel Company, Sparrows Point, Md., is said to be planning the construction of a large blacksmith shop to cost about $75,000.

Chicago

CHICAGO, ILL., May 22, 1916.

The trade has in hand several inquiries for shell making tools which are contingent upon the placing of large shell contracts now under negotiation in the Central West. A few inquiries for ammunition tools from Canada are also in the market. In general, prospective business, aside from railroad requirements already mentioned, is of rather moderate proportions. Inquiry for single tools for general manufacturing purposes is continuous and little relief is felt from the pressure for grinding machinery. It is interesting to note that except as emergency situations demand, manufacturing buyers of machine tools have no inclination to accept the so-called "war tools" as a substitute for standard lines, even at favorable prices. Recent sales of cranes have been of importance in this market, the purchase of nine of various capacities for the new shops of the Chicago, Burlington & Quincy Railroad at West Burlington being especially prominent. Capacity for the manufacture of automobile accessories is being increased by leaps and bounds and numerous reports of new organizations have recently appeared. The L. O. Gordon Mfg. Company, of which J. V. Whitbeck, Cleveland, Ohio, is president, and L. O. Gordon, secretary and treasurer, is a recent organization with a capital of $75,000 and a plant at Muskegon, Mich., engaging in this business.

The Salter Mfg. Company, Chicago, is building a three-story addition, of mill construction, 60 x 63 ft., in Oakley Boulevard near Northwestern Avenue at a cost of $15,000. The company is a manufacturer of furniture.

The J. D. Freese & Sons Company, 2501 Homer Street, Chicago, furniture manufacturer, is building an addition to its plant, 75 x 124 ft., to cost $25,000.

A. P. & H. S. Lovejoy, 718 North Fifth Avenue, Chicago, has had plans prepared for the remodeling of a four-story box factory, 85 x 175 ft.

The Cole Mfg. Company, stove manufacturer, 3218 South Western Avenue, Chicago, is building a three-story addition, 150 x 185 ft., to cost $75,000.

The Ryan Car Company, 135th Street and Brandon Avenue, is building a powerhouse, 37 x 200 ft., to cost $15,000.

L. E. Russell, 25 North Dearborn Street, Chicago, is about to have erected an automobile service station, 45 x 180 ft., to cost $10,000.

The new foundry and machine shop of the W. A. Jones Foundry Company, Chicago, now under construction, is to cost $200,000.

The Joy Ball Bearing Company, Chicago, has been incorporated with a capital of $60,000 by Charles H. Joy, Sr., 4727 Malden Street; Charles H. Joy, Jr., and Alfred Geahart.

The Independent Can Company, Kinzie and Wood streets, Chicago, has had plans prepared for a two-story factory, 49 x 100 ft., to cost $20,000.

The Chicago & Western Illinois Railway has made an appropriation for new coach and paint shops, to be erected at Danville, Ill.

The Keystone Steel & Wire Company, Peoria, Ill., has increased its capital stock from $1,000,000 to $5,000,000, in order to carry out its plans for a new steel plant, contracts for part of which have already been let.

The Durand Steel Locker Company, Chicago Heights, Ill., will build an addition to its plant to cost $22,000.

The plant of the Universal Welding Company, St. Anne, Ill., valued at $150,000, was completely destroyed by fire.

The Geneva Foundry, Geneva, Ill., is erecting an addition 40 x 40 ft. This is the second addition made to this plant within a short time.

Belleville, Ill., will erect a light and power plant to cost $350,000.

F. G. Bayne, Quincy, Ill., has acquired property at Bushnell, Ill., on which a factory will be erected for the manufacture of automobile accessories.

W. F. Park, Cherokee, Iowa, has purchased the woodworking machinery and equipment of the Cherokee Mfg. Company and has organized the Park Mfg. Company, which will be located at Second and Cedar streets in the manufacture of interior cabinet work.

Cleveland

CLEVELAND, OHIO, May 22, 1916.

Some new demand for lathes for munition work, which has been inactive for a time, has sprung up, several inquiries having come out for small lots of machines for work on high explosive shells. Orders placed the past week include one from an Ohio manufacturer for 12 milling machines and another for 12 hand screw machines for export. A large amount of new factory building and extensions for metal-working industries is noted, for which general equipment and machine tools will be required. Plants making automobile parts continue very busy, the call being particularly heavy for forgings. The railroad demand is not active but the New York Central has several inquiries out for motors with the view of installing motor drive in some of its shops. Orders for industrial cars and motors are very heavy, coming largely from steel plants.

The Atlas Car & Mfg. Company, Cleveland, has outgrown the capacity of its recently built plant and is planning the erection of another building that will provide 60,000 additional square feet, making 100,000 ft. of floor space in all. The contract will be let shortly.

The P. H. Biggs Machinery Company, 809 Hippodrome Building, Cleveland, dealer in machinery, has changed its name to the Biggs-Watterson Company. Charles E. Watterson, recently the Dayton, Ohio, representative of the Pattison Supply Company, Cleveland, has become associated with P. H. Biggs.

The American Speed Machinery Company, Cleveland, has been incorporated with a capital stock of $25,000 and on June 1 will take over the business of the Poese Machine & Mfg. Company. V. C. Lynch is president, O. G. Painter and E. A. Distelhorst who have been carrying on the business of the Poese Company, are vice-president, secretary and treasurer respectively. The company has outgrown its present floor space and will move as soon as larger quarters can be secured.

The Davies-Mitchell Engineering Company, 220 Union Building, Cleveland, has been organized to build six and twelve-cylinder automobile motors and expects to begin the erection of a plant in about 90 days.

The commissioner of purchases and supplies, Cleveland, will receive bids May 28 for an engine and turbine of automatic control, and an oiler and filter system for the Division Avenue pumping station.

The Berger Mfg. Company, Canton, Ohio, has asked for bids for an addition to its black and galvanizing department, 73 x 300 ft., and a warehouse, 50 x 300 ft. It is stated that in a short time it also expects to erect two other buildings, 80 x 300 ft., two stories, and 25 x 300 ft., one story, respectively.

The Timken Roller Bearing Company, Canton, Ohio, has placed contracts for two new buildings, one 50 ft. wide, U shaped, the base 105 ft. long and the side sections 220 and 210 ft. in length, three stories. This will be partly for office and manufacturing purposes. The other will be 100 x 105 ft., one story, for factory use. These extensions are in addition to other construction work planned by the Timken interests previously announced.

The Standard Die Tool & Machine Company, Toledo, Ohio, recently incorporated with a capital stock of $10,000, has established a plant for making dies and tools in the Toledo Factories Building.

The DeVilbiss Mfg. Company, Toledo, Ohio, has increased its capital stock from $300,000 to $600,000 and plans to erect a new plant on a site recently acquired near the Lake Shore Railroad in West Toledo.

The Duncan Company, Toledo, Ohio, representing a consolidation of the Duncan Forge Company, the Vulcan Iron Works, and the Bellefontaine Steel Shovel Company, will move its plant to Sandusky, Ohio, having arranged to take over the property of the People's Portland Cement Company.

The Toledo Storage Battery Company, Toledo, Ohio, has incorporated with a capital stock of $10,000 and will build a factory to manufacture storage batteries. Fred A. Tefft, Herman A. Weiner and Paul T. Gaynor are the incorporators.

The foundry of the Power Mfg. Company, Lima, Ohio, maker of oil engines, was burned a few days ago. It is considering moving from Lima to a Western city as its product is extensively used in Western oil fields. If it decides to remain in Lima the foundry will be rebuilt.

The Sandusky Road Machinery Company, Sandusky, Ohio, recently incorporated with a capital stock of $25,000, will soon begin operations in part of the plant of the Ohio Engine Company.

The Bay View Foundry Company, Sandusky, Ohio, producer of gray-iron castings, automobile, marine and stationary gas engine parts, has let all steel, general and equipment contracts and cleared the ground for additions to its molding floors, 65 x 150 ft., and cleaning room, 25 x 90 ft. These additions are the second the company has made in the past eight months, and are required to take care of a constantly growing demand. Contracts call for the completion of the extensions within 100 days. E. L. Marsh is secretary and treasurer.

The H. M. Lane Company, Detroit, Mich., is preparing plans for the continuous malleable foundry for the Timken-Detroit Axle Company at Canton, Ohio, previously mentioned. This is planned to handle the product with the greatest mechanical efficiency possible.

The American Shipbuilding Company has received bids for its proposed new brick and steel foundry, 120 x 200 ft., to be built in connection with its Lorain, Ohio, yards.

The White Sewing Machine Company, Cleveland, plans to erect a one-story factory addition, 90 x 250 ft., of brick, steel and concrete.

The Ninth Street Terminal Warehouse Company, Cleveland, will erect a steel and concrete building, 400 x 500 ft., with eight stories in front and twelve in the rear. Considerable equipment will be required, including 11 freight elevators. Plans are being prepared by Fulton & Taylor, architects, Hippodrome Building, and Albert M. Allen & Co., engineers, Euclid Building.

The American Sheet & Tin Plate Company has taken bids for a three-story pattern storage building, 50 x 122 ft., for its Canton, Ohio, plant.

Indianapolis

INDIANAPOLIS, IND., May 22, 1916.

The Maxwell Motor Company has let contract for the steel structural work for the addition to its plant at Newcastle, Ind. It is estimated that about $300,000 will be expended, $200,000 for new buildings, $75,000 for machinery and equipment and the remainder for incidental expenses.

The Haynes Stellite Company, Kokomo, Ind., is contemplating the erection of a new plant to provide for the extensive manufacture of stellite.

The Lawndale Mfg. Company, Elkhart, Ind., has been organized with a capital of $75,000 and has secured factory space in which equipment is being installed for the manufacture of automobile parts. The company has taken a contract involving considerable work for the Foster Machine Company. Andrew H. Beardsley, William H. Foster and James A. Bell are the directors.

The Kokomo Oscillating Fan Company, Kokomo, Ind., has increased its capital stock from $125,000 to $250,000.

The Ross Gear & Tool Works, Lafayette, Ind., will install an internal combustion engine to supply its own power.

I. M. Bangs, Machias, Me., the inventor of a tree-sawing machine, has sold the right to manufacture it to a new company, the American Mechanical Saw Company, Indianapolis, Ind.

The White-Rafert Company, Terre Haute, Ind., has been incorporated with $25,000 capital stock to manufacture dental and surgical instruments. B. B. White, A. E. Rafert and L. J. White are the directors.

The Central Plating & Mfg. Company, Indianapolis, Ind., has been incorporated with $10,000 capital stock to manufacture plating novelties. The directors are E. A. Cooper, Henry H. and D. B. Higert.

The Automatic Mfg. Company, Indiana Harbor, Ind., has been incorporated with $25,000 capital stock to manufacture household utilities. The directors are Fred S. Usher, P. Dale Shook and Christian T. Dallas.

The Wayne Belting & Supply Company, Fort Wayne, Ind., has been incorporated with $25,000 capital stock by Wert D. Whipple, Delbert H. Coan and Leo J. Riegling.

The Indiana Steel Products Company, Valparaiso, Ind., has increased its capital stock from $10,000 to $50,000.

The Peerless Brass Foundry & Machine Company, South Bend, Ind., has elected J. A. Wilskey, president and general manager; R. F. Miller, vice-president, and J. H. Woodward, secretary and treasurer.

Cincinnati

CINCINNATI, OHIO, May 22, 1916.

The domestic demand for machine tools continues to improve. Orders and inquiries from all parts of the country are reported, but buying is mostly of single tools. The automobile and auto-truck manufacturers are probably the best customers; but rumors are out that the railroads will also buy a considerable number of machine tools in the near future. Orders from munition manufacturers are growing scarcer, although for special machines a fairly good demand is still to be had from that source. Foreign business is slow.

The mill and factory supply business, that experienced a slump the first week in May, due to labor troubles, has now regained all lost ground and is forging ahead rapidly. The trouble confronting the trade is the inability of the manufacturers to make prompt shipments on many necessary shop supplies. The boiler and tank business is on the mend. Wood-working machinery is also in better demand. The jobbing foundries are all busy and are operating with full forces.

The Cincinnati Iron & Steel Company, Cincinnati, has had plans prepared for additions to its plant on Freeman Avenue, 80 x 260 ft., and 80 x 150 ft., respectively, one story, of brick and steel construction, to be used principally for storage purposes.

The Cisco Machine Tool Company, Cincinnati, has had plans prepared for an addition to its plant in Cumminsville, 30 x 230 ft., one story, of brick and steel construction.

The Pittsburgh Glass Company, whose Cincinnati branch is at Court Street and Broadway, is reported to be considering the erection of a plant in Cleves, Ohio, a Cincinnati suburb.

The Union Gas & Electric Company, Cincinnati, has commenced work preparing foundations for a plant to be erected at Front and Race streets.

The T. R. Heble Malt Milling System Company, Cincinnati, has been incorporated with $10,000 capital stock to manufacture special equipment for treating malt. A factory will be established in Cumminsville. Charles F. Heble and Boniface Heble are among the principal incorporators.

The Miami Tool & Die Company, Dayton, Ohio, whose incorporation was recently noted, has fitted up a factory in the Pryor Building. The company expects to add to its manufacturing facilities at an early date.

The Dayton Engineering Laboratories Company, Dayton, Ohio, has acquired a site on East First Street on which an addition to its plant will be erected at a future date. No plans have yet been prepared.

The Malm Machine Company, Dayton, Ohio, whose incorporation was previously noted, is fitting up a plant for the manufacture of rotary punching presses. Axel Malm is president of the company.

The Blackwood Steel Castings Company, Springfield, Ohio, to be incorporated with $450,000 capital stock, is having plans prepared for the erection of a large steel foundry plant. The main building will be 135 x 300 ft., the cleaning and shipping department 75 x 100 ft., and two other structures 20 x 150 ft. All will be one story and of fireproof construction. A. F. S. Blackwood, now of the Monarch Steel Castings Company, Detroit, Mich., will be president of the new company, and J. H. Galvin, Lima, Ohio, vice-president and general manager.

The city of Columbus, Ohio, is contemplating the erection of a plant for distilling alcohol from garbage waste.

The Columbus Malleable Iron Company, Columbus, Ohio, will erect a one-story addition to its plant estimated to cost $60,000. Work will be commenced at an early date.

The Joseph Schonthal Iron Company, Columbus, Ohio, has purchased at a receiver's sale the Columbus & Southern Railway. The price was $42,000. It is understood that the road will be dismantled and all the equipment sold.

It is reported that the Griest Mfg. Company, New Haven, Conn., will establish a plant at Xenia, Ohio, for the manufacture of war munitions.

The Lorimer-Hicks Mfg. Company, Troy, Ohio, will establish a plant for the manufacture of talking machines. G. W. Lorimer is president.

The Western Machinery Company, Cincinnati, is moving its plant from Sixth and Baymiller streets to 12 West Third Street. It sells and repairs second-hand machinery, and also makes a specialty of new machine tools. The move was made necessary on account of the increase in its business in the past year. C. H. Norton is general manager.

Charles E. Adair will establish a plant in Leesville, Ohio, for the manufacture of incubators.

The Seneca Wire & Mfg. Company, Fostoria, Ohio, has broken ground for a one-story addition to its plant, 100 x 245 ft.

Detroit

DETROIT, MICH., May 22, 1916.

The Springfield Metal Body Company, Detroit, has acquired a tract of twenty-seven acres in West Detroit as a site for a new plant, the erection of which will be begun within a few weeks. A one-story building containing 500,000 sq. ft. of floor space will be the initial unit.

The Electro Automatic Refrigerating Company, Detroit, has been incorporated with $10,000 capital stock to manufacture a line of mechanical devices. The stockholders include E. J. Copeland, C. H. Fenn and R. E. Densmore.

The Maxwell Motor Company, Detroit, automobile manufacturer, is completing improvements to its plant involving an outlay of $250,000, which will greatly increase its production.

The Turner-Moore Mfg. Company, Detroit, manufacturer of machine products, has let the contract for the erection of a new two-story brick and steel factory building at McKinstry Avenue and the Michigan Central Railroad.

The Schoenborn Cowles Mfg. Company, Detroit, manufacturer of brass specialties, has commenced the erection of a two-story brick and steel factory.

The C. M. Hall Lamp Company, Detroit, manufacturer of automobile lamps, has increased its capital stock from $300,000 to $750,000.

The Kawneer Mfg. Company, Niles, Mich., manufacturer of store fixtures, has begun the erection of two additions to its plant, 18 x 60 ft., two stories, and 25 x 125 ft., one story.

The Ann Arbor Machine Company, Ann Arbor, Mich., has increased its capital stock from $100,000 to $150,000.

The Spencer-Smith Machine Company, Howell, Mich., manufacturer of pistons, is enlarging its plant by the erection of a one-story addition, 40 x 100 ft.

The Limousine Top Company, Kalamazoo, Mich., manufacturer of automobile tops, has acquired an additional building and will increase its output considerably.

The Standard Gear Company, Kalamazoo, Mich., has been organized to engage in the manufacture of automobile parts and has secured temporary factory quarters. F. B. Lay is general manager.

The Kompass & Stoll Company, Niles, Mich., manufacturer of kitchen cabinets, is enlarging its plant by the erection of a two-story addition, 75 x 75 ft.

The Crown Fender Company, Ypsilanti, Mich., will increase its capital stock from $60,000 to $100,000. The new plant of this company is nearing completion and is expected to be in operation within a short time.

The H. B. Sherman Mfg. Company, Battle Creek, Mich., will erect an addition to its plant, for the manufacture of electrical goods.

The D'Arcy Spring Company, F. P. D'Arcy, proprietor, has purchased the plant and equipment of the Western Wire & Woodenware Company, Portland, Mich., which business will be moved to Kalamazoo, and the construction of an addi-

tional saw-tooth design factory, which will double the present floor space, is to be undertaken at once.

The Parker Rust Proof Company of America, 864 Woodward Avenue, Detroit, Mich., will erect a fireproof building, 100 x 150 ft., on the site which it recently purchased on York Street. Contracts for the construction and equipment which includes motors, compressors and gas producers have not been let. Similar equipment will be required later for companies operating under licenses granted to them by the Detroit company.

Milwaukee

MILWAUKEE, WIS., May 22, 1916.

The demand for machine tools shows an absence of steady demand which followed the feverish buying of last summer and fall. Trade is still brisk, due to the resumption of industrial extension programs which were interrupted during recent months by the inability to get assurance of delivery of equipment. The demand, however, is principally for single tools, with here and there an inquiry for a lot of considerable size, the answer to which probably decides the fate of the enlargement plan which generally accompanies it. Business in mining machinery is the best that it has been in a number of years, due to the renewed activities in all classes of mining work, especially in the lead and zinc fields of southwestern Wisconsin.

The Thomas B. Jeffery Company, Kenosha, Wis., maker of automobiles and motor trucks, has awarded a contract to the Arnold Engineering Company, 105 South LaSalle Street, Chicago, for erecting additions to cost over $250,000. Plans are being completed for a 40-ton gray iron foundry, one story, of steel and concrete, 120 x 650 ft., and a body-building shop, 150 x 250 ft., four or five stories. Charles T. Jeffery is president and general manager.

The Warning Sheet Metal Company, Ceape and State streets, Oshkosh, Wis., is building a two-story brick addition, 40 ft. square, and will install some new sheet-working equipment.

The Wisconsin Packing Box Company has been organized with a capital stock of $5,000 by Elie Scherr, 186 Reservoir Avenue, Milwaukee, to manufacture wooden packages. Max Lubow and B. Mendelson are associated with Mr. Scherr in the enterprise.

The Mount Pleasant Dairy Company, West Allis, Wis., is preparing to build a new plant, including a cold-storage plant requiring a 10-ton refrigerating unit. W. R. McKowen is manager.

E. A. Zorn, Osceola, Wis., awarded contracts May 22 for the erection of a garage and repair shop, 50 x 100 ft., one and two stories.

The Wisconsin board of normal regents has engaged Van Ryn & DeGelleke, architects, Caswell Block, Milwaukee, to prepare plans for the proposed manual training building for the normal school at Superior, Wis. It will be of brick and stone, two stories, about 80 x 120 ft., and cost $80,000. Bids will be taken by William Kittle, secretary, Madison, Wis.

The Chase-Banderob Company, furniture manufacturer, Oshkosh, Wis., will add to its to its products the manufacture of an aluminum washing machine. Fifty men have been added to the force. H. C. Doman is in charge.

The Universal Foundry Company, Oshkosh, Wis., recently reorganized with $10,000 capital, has broken ground for a gray iron foundry at the foot of Pine Street, 70 x 200 ft., to include the pattern shop and vault. Robert Ziebell has been elected president; L. J. Monahan, vice-president; Arthur Ziebell, secretary; John D. Termaat, treasurer. A general commercial casting business will be done, and later it is the intention to add a malleable furnace. Production will start about June 15.

The Aluminum Goods Mfg. Company, Manitowoc, Wis., which is erecting a large addition, 50 x 300 ft., five stories, is preparing to undertake the erection of another manufacturing unit, 50 x 150 ft., two stories and basement, made necessary by increased business since plans were drawn for the original addition. The contract has been awarded to Walter Oeflein, North Milwaukee, Wis., who is erecting the present shop. George Vits is president.

Frank Mulkern, 226 Grand Avenue, Milwaukee, has purchased a site, 116 x 132 ft., and will enlarge his garage and repair shop at a cost of $50,000. This will make its capacity in excess of 350 cars.

The Arrow Fuse & Mfg. Company, Milwaukee, has been organized by Oscar H. Jung, chief electrician of the Schlitz Brewing Company, and other members of the organization, to manufacture renewable fuses. It will be the first plant of its kind in this part of the country. Operations will start about July 1 in leased quarters and later a factory will be erected. Herbert E. Uihlein is president; W. J. Kozick, vice-president; E. M. Fohey, secretary, and Mr. Jung, treasurer.

Arthur and Charles Schumacher, Delavan, Wis., operating the Delevan Lake Boat & Engine Company, have dissolved partnership. Arthur Schumacher will take the interests in the city of Delavan and Charles the boat and engine plant at Delavan Lake. No improvements are contemplated.

Details of the enlargement plans at the Eclipse works of the Fairbanks-Morse Company, Chicago, in Beloit, Wis., which is to cost $400,000, have just been made public, and call for the following new construction: Central power plant, 90 x 274 ft. of reinforced concrete, steel-trussed; foundry office, chemical laboratories, pattern storage and millwright department, 70 x 177 ft.; addition to machine molding foundry, 92 x 120 ft., of brick and mill construction; addition to heavy molding foundry, 80 x 108 ft., reinforced concrete and steel-trussed, with basement for sand storage. The total floor space afforded by the new construction is approximately 57,000 sq. ft. The general contract is in the hands of William Fitzgerald. Ground has already been broken for the new power plant, to be finished first.

The Janesville Tractor & Engine Company, Janesville, Wis., expects to occupy its new plant June 1. The building was erected entirely by volunteer labor, the company being composed of union workmen of Janesville, each of whom donated one day's labor. The cost of the site and materials was raised by popular subscription. The equipment is now being contracted for.

The Badger Wire & Iron Works, 687 Muskego Avenue, Milwaukee, which recently incorporated its long-established business, is preparing to spend about $20,000 for an addition, 105 x 140 ft., of brick, concrete and steel, one story. The factory will be equipped throughout with individual motor drive.

The Racine Piano Bench Company, Racine, Wis., has been incorporated with a capital stock of $25,000 to manufacture piano stools, benches and similar products. The organizers are S. B. Way, D. E. Callender and Emil Jorgenson, officials of the Wisconsin Gas & Electric Company, which recently purchased from the receiver the plant of the Racine Stool Mfg. Company, and will place it in operation at once.

The Newport Hydro-Carbon Company, Milwaukee, owned by the Ferdinand Schlesinger interests, dedicated its $2,000,000 plant at Carrollville, Sunday, May 21. The plant covers nearly 150 acres and will employ from 1750 to 2000 men in the manufacture of the intermediaries for making coal tar dyestuffs. Five of the fifteen buildings which will comprise the complete plant are now ready for operation.

J. D. Casey, Watertown, Wis., is building a garage and repairshop, 40 x 90 ft., two stories and basement.

The Standard Crucible Steel Castings Company, Milwaukee, Wis., has increased its capital stock from $10,000 to $25,000.

The Laursen Automatic Pump Company, Menominee, Wis., has acquired a building at Green Bay, Wis., where it will operate a second manufacturing plant.

The Ozaukee Heater Company, Ozaukee, Wis., has let the contract for and started construction of a new plant, 36 x 125 ft., at Saukville. The company manufactures oil burners and stoves.

The Central South

LOUISVILLE, KY., May 22, 1916.

Orders for work and materials continue to arrive in seasonable lines, although there has been a reduction in the business done by that section of the trade which takes care of the trades that are dependent on seasons. There is nothing stirring in the ice machinery line although there have been some inquiries from distillers who have converted their plants into alcohol stills. As yet no orders have been handled in this department for the reason that the requirements are such that the cost of the installation appears prohibitive. Machine tools continue in demand and electrical equipment shows improvement.

W. H. Gillette, J. M. Lanham and W. L. Gillette have incorporated the Louisville Oak Flooring Company, with $25,000 capital, and will establish a plant at Twenty-second Street and Magnolia Avenue to cost $20,000.

Formal affirmation of ownership of the Falls City Machine Tool Company, recently organized and established in a plant at Floyd and Lee streets, has been filed in the county clerk's office at Louisville by the Weir Frog Company.

The school board, Somerset, Ky., is installing and equipping machine shops and making other additions to the schools for manual training courses next fall.

The American Metallic Packing Company, Lexington, Ky., is in the market for a 36-in. gage used log loader.

W. D. Mullins, Wingo, Ky., is chairman of a civic committee which proposes to establish a municipal lighting plant to cost $10,000.

Oscar Stafford, Lexington, Ky., is establishing a woodworking plant at Beattyville, Ky.

William Grosbach, Bedford, Ind., is seeking a location for an excelsior factory and is asking for addresses of manufacturers of excelsior-making machinery. He proposes to begin operations in the fall, if a suitable location can be found.

The Warren Bros. Company, Nashville, Tenn., will establish a branch factory in Chattanooga, Tenn., for the manufacture of paint. It is stated that the plans provide for a moderate beginning with a view to increasing the operation later.

The Bellgrade Lumber Company, Memphis, Tenn., has purchased 4500 acres of timber land in Yazoo and Sharkey counties, Miss., and will establish a sawmill either at Midnight or Louise, Miss., according to John W. McClure, secretary.

The Robinson Balance Slide Valve Company, Bristol, Tenn., has been incorporated with $150,000 capital to manufacture a special slide valve for locomotives. Bird M. Robinson is president and F. P. Robinson, secretary and general manager.

The Kalbfleich Chemical Corporation, Chattanooga, Tenn., will build a plant to manufacture chemicals, to cost about $75,000. H. W. Sparks is manager.

Birmingham

BIRMINGHAM, ALA., May 22, 1916.

The Board of Trade of Brunswick, Pa., through its secretary, Albert M. Smith, has made a statement concerning recent developments there in wood shipbuilding. The Brunswick Shipbuilding Company, organized May 15, has a 600-ton schooner one-third completed. The company has been organized among Brunswick residents, with some stock taken outside. It has inquiries for two five-mast and two four-mast schooners with large auxiliary oil-burning engines. E. H. Mason is president; J. H. Leo, vice-president and general manager, and Linton E. Allen, secretary and treasurer. A second enterprise at Brunswick is the Brunswick Marine Construction Corporation, which now has a force at work clearing up a water front site. The keel of the first four 2000-ton auxiliary schooners is now being laid. Their auxiliary oil-driven engines will be of 750 hp. The shop building is in readiness for the machinery. The Traut Lumber Company has a plant on the water front between the two shipbuilding plants and will cut lumber for both. The Brunswick Marine Construction Corporation may eventually develop sufficiently to build steel vessels.

F. Chris Kramer, Savannah, Ga., will shortly begin the erection of a factory, 150 x 200 ft., of steel and reinforced concrete for the manufacture of bodies for commercial automobiles, automobile wheels, etc. The equipment has been purchased and will have a daily capacity of 600 wheels from 24 to 28 in. in diameter. A site has been purchased on Dale Avenue and it is expected that the plant will be ready for operation April 1, 1917.

The Bayshore Foundry Company, Pensacola, Fla., recently incorporated, has about completed its plant. It will do a general line of repair work, especially on grate bars and iron and brass castings. It is not in the market for machine tools at present but undoubtedly will be in the near future. The following officers compose the board of directors: President, W. N. Ford; vice-president, Reuben Massey, Jr.; secretary and treasurer, J. A. Stauter.

The Scotch Lumber Company, Fulton, Ala., has purchased 10,000 acres of timber land in Clark County for developing purposes.

The E. E. Jackson Lumber Company, Keyser Building, Baltimore, Md., will build an extensive lumber plant in Choctaw County, Ala.

The Louisville & Nashville Railroad will enlarge its shops at Mobile at a cost of $400,000.

The Macon-Atlantic Navigation Company, Atlanta, Ga., capital stock $200,000, has been incorporated to promote the building of river craft and increasing power development on the Ocmulgee River.

The Yaryan Rosin & Turpentine Company, Brunswick, Ga., will build a wood pulp plant to cost $200,000. James F. Brailey, Jr., is vice-president.

The North State Veneer Company, Statesville, N. C., will erect a plant in Camden, S. C., but has not settled upon details. Clarence Stimpson and P. D. Kennedy are the proprietors.

St. Louis

ST. LOUIS, MO., May 22, 1916.

Conditions in the machine tool market are beginning to show some signs of improvement regarding the needs and requirements of long-waiting industries. While long-deferred delivery on many types of tools still exists, the delivery of equipment contracted for many months ago is giving relief. Second-hand tools are entirely out of the market. Collections are very good and discounts are being more generally taken than ever before.

The John Clemens Sheet Metal Company, St. Louis, Mo., has been incorporated with a capital stock of $13,500 by John Clemens, Oscar Luedde and others and will manufacture sheet metal.

The Ripley Mfg. & Machinery Company, Joplin, Mo., has been organized with a capital of $2,000 to build mining machinery. The organizers are J. F., E. C., and C. B. Ripley.

The H. M. T. Chemical Products Company, St. Louis, Mo., has been incorporated with a capital stock of $100,000 by Sam S. Medalie, C. H. Hoffmann and H. W. Trippett to manufacture chemicals, dyes, etc.

The Howard Auto Company, St. Joseph, Mo., has been incorporated with a capital stock of $17,500 by F. W. Howard and David D. and A. A. Rullman and will equip a machine shop and garage.

The Barks & Barstow Mfg. Company, St. Louis, Mo., has acquired a site and will equip a new plant to manufacture steel specialties and roofing materials. The present plant is at Valley Park, Mo.

The Cameron Coal Company, Kansas City, Mo., has been incorporated with a capital stock of $30,000 by J. S. Rowland, Thomas Bowen and W. R. Green and will install coal mining and power plant machinery on its property.

The Universal Concrete Company, Kansas City, Mo., has increased its capital stock from $10,000 to $25,000 to add to its equipment.

Slater, Mo., will add a motor-driven pump and other machinery to cost about $35,000 to its waterworks and electric light plant. L. E. Shepherd is in charge.

The Arkansas Light & Power Company, Marianna, Ark., will add one 75-kw. and one 100-kw. unit, one 300-k.v.a. generator, direct connected to a Corliss engine, boilers, etc., to its plant.

The Arkansas Hydro-Electric Company, Heber Springs, Ark., has been incorporated with a capital stock of $50,000 by A. R. Amos, G. A. Watkins and W. D. Dickinson, Little Rock, and E. T. Stanfield, Edgemont, Ark., and will equip a hydroelectric generating plant at Heber Springs.

The McLean Hardwood Lumber Company, Buffalo, N. Y., will equip a hardwood lumber mill at Argenta, Ark., to cost about $100,000.

The O'Brien Gin Company, Ardmore, Okla., has been incorporated with a capital stock of $10,000 by J. D. O'Brien, J. M. Jones and C. C. Jones to equip a ginning plant.

The Farmers Custom Gin Company, Vanoss, Okla., has been incorporated with a capital stock of $16,000 by C. L. Brooks, G. L. Standridge and J. E. Kinsey and will equip a plant.

The Blackwell Milling & Elevator Company, Blackwell, Okla., will increase its plant equipment at a cost of about $100,000.

The Bluff Gasoline Company, Sapulpa, Okla., B. M. Van Orman, engineer in charge, will equip a pipe line and is in the market for pumps, engines, etc.

Henryetta, Okla., will install electrically driven pumps in its waterworks plant. The mayor can be addressed.

The Louisiana Fiber Board Company, Bogalusa, La., and the River Raison Paper Company, Monroe, Mich., will equip a $1,000,000 wood fiber plant at Hattiesburg, Miss.

Richton, Miss., will expend about $15,000 in equipping a waterworks plant. The mayor can be addressed.

The Carl Shipp Electric Light & Power Company, Winnsboro, La., is in the market for Diesel oil engines, direct current generators, etc.

The Glenmora Light & Power Company, Glenmora, La., F. P. Joseph, manager, will install waterworks equipment, including underwriters' pump.

Lake Charles, La., will install waterworks equipment to cost about $150,000.

J. L. White and W. R. Perkins, Lake Charles, La., will equip a garage and machine shop for automobile work.

Daniel Jeffrey & Sons, Inc., has been incorporated at Jeannerette, La., with a capital stock of $10,000 by Dan Jeffrey, Robert W. Jeffrey and Dan F. Jeffrey to manufacture boilers.

San Francisco

SAN FRANCISCO, May 16, 1916.

Delay in placing orders on some large lists in the last few weeks seems to reflect a slight hesitation on the part of important buyers; but the volume of orders placed is exceptionally large. Metal-working establishments of all kinds in the San Francisco district have probably never had such a rush as at present. Several new shipbuilding projects are held up for lack of material. The jobbing foundries have been running about at capacity for some time. Forge shops are extremely busy on marine, oil-tool and miscellaneous work. Implement manufacturers are running at capacity, and are constantly spreading out. Some of the gas engine plants are running three shifts and overtime is the rule in riveted pipe and boiler works. The garage and small repair shop trade is now coming into more prominence, showing more willingness to meet market conditions. All kinds of machinery are in strong demand in the oil fields, and buying for mines throughout California is on a large scale. Lumber mill orders are coming in well, but several districts are still to be heard from.

The C. L. Best Gas Traction Company, Oakland, Cal., is preparing to move its traction engine plant, which will be materially improved. Sites are being considered at Melrose Station, on the Oakland waterfront and in San Leandro. The department conducted as the Best Steel Casting Company will remain on the present location. C. L. Best, president of the company is now in the East.

The American Forge Company, San Francisco, has just installed a new 1500-lb. steam hammer.

The Straub Mfg. Company, operating a foundry, has arranged to lease the old plant of the International Excavator Company, at Hayward, Cal.

S. D. Sturgis is building a machine shop at 719 East First Street, Los Angeles.

Figures have been taken for several iron and wood-working machines for the manual training department of the high school, Bakersfield, Cal.

E. T. Murray has arranged to take over the interest of his associates in the Southwestern Machinery & Supply Company, Headlight, N. M.

The R. W. Haight Company, San Diego, dealer in pumps, engines and general machinery, has opened a new establishment at Fresno, Cal.

The Regan Forge & Engineering Company, Los Angeles, manufacturing oil tools, is preparing to move to a tideland site in Los Angeles harbor.

The Pacific Northwest

SEATTLE, WASH., May 16, 1916.

Never before has the Pacific Northwest experienced such a shipbuilding boom. Every plant is working to capacity, with night shifts, and several new plants have been erected this spring. The call for bottoms has sent prices soaring, and it seems impossible to supply this demand. The quarterly shipping report of the Pacific Lumber Inspection Bureau shows that approximately 18,000,000 ft. of lumber has been shipped to Europe in the first three months of this year. Before the war the greatest amount of lumber shipped from the Northwest to Europe in a single year was 35,000,000 ft.

The Weiser Milling & Elevator Company, Weiser, Idaho, will soon begin work on the construction of a 300 bbl. flour mill and a 90,000 bu. concrete elevator. According to J. H. Russell, manager, it also plans the construction of a 50,000 bu. elevator at Midvale during the summer.

The Kalispell Lumber Company, Kalispell, Mont., has closed its mill, and will move to Essex, where a sawmill of 50,000-ft. daily capacity will be erected.

The plants of the Montana Sash & Door Company and the Cardell Ridge Lumber Company, Billings, Mont., were destroyed by fire with a loss of more than $200,000.

The Pioneer Implement & Auto Company, Grass Range, Mont., has been incorporated, with capital stock of $10,000, by Allan R. McKenzie, Ebba E. McKenzie and Ira R. Elliott.

A planing mill with 50,000 to 60,000-ft. capacity will be erected in Grants Pass, Ore., by Frank P. Doe & Co., San Francisco.

The Washington Shipping Corporation, Seattle, has awarded contract to the Puget Sound Bridge & Dredging Yards, Seattle, for the construction of two additional wooden ships of 2500 tons capacity, schooner type, equipped with auxiliary power and to carry 1,500,000 ft. of lumber.

The Occident Flouring Company, Billings, Mont., a subsidiary of the Russell Miller Company, will erect nine grain elevators in the vicinity of Billings, to cost $8,000 each.

The Northwest Steel Company and the Willamette Iron & Steel Works, Portland, Ore., which recently organized a shipbuilding plant in Portland, have secured contracts for vessels costing more than $4,000,000, according to J. R. Bowles, president of the Northwest Steel Company, who recently returned from the East.

Texas

AUSTIN, TEX., May 20, 1916.

Good rains the past week, covering most of the State, have still further enhanced crop prospects. The machinery and tool trade is very satisfactory. The demand for mill machinery is unusually large.

The Mutual Refinery Company, Sherman, will build and operate an oil refinery. About $100,000 will be invested in the enterprise.

Duncan, Young & Co., New York, are reported to have been investigating a plan to construct a shipbuilding yard at Beaumont.

Mayor H. D. Lindsley of Dallas announces that the United Electric Securities Company, subsidiary of the General Electric Company, has arranged to take over the local traction and electric lighting and power properties in Dallas of the Stone & Webster Engineering Corporation. New companies will be organized to operate the properties. Extensions to cost about $2,000,000 will be made to the traction and lighting systems.

The Deport Oil Mill, Deport, will build a cotton-seed oil mill to cost about $35,000.

The Mexico Guayule Company will erect a factory at El Paso for extracting rubber from the guayule shrub. The plant will cost about $50,000.

The Maxwell Motor Company, Newcastle, Ind., plans to build an automobile assembling plant at Dallas.

The Chevrolet Motor Company has acquired a site just outside the city limits of Fort Worth for the new assembling plant which it will build. The building will be of brick and concrete, two stories, containing 150,000 sq. ft. of floor space.

Canada

TORONTO, ONT., May 22, 1916.

Canadian steel companies continue active, a large amount of new business is offering. With the large number of orders coming from France for cars and railway equipment, and the demand for road equipment for home railways, the steel companies manufacturing this equipment are experiencing considerable activity. It is expected that large orders for cars will also be placed in Canada by Russia in the near future. The Canadian companies are also looking to the other British Dominions for considerable business. Orders for war munitions of all kinds are being given out continually by the Imperial Munitions Board, as well as by Russia and the other allied powers.

The labor problem is causing considerable anxiety in Ontario, and it is necessary for some of the larger companies to secure the required help in the Province of Quebec. There are practically no orders being accepted by the steel companies for immediate delivery as it is impossible for the companies to fill such orders, but the books are being opened for delivery in the distant future. In Ontario equipment for electric plants, waterworks plants and other municipal works is in brisk demand. Activity in the automobile industry continues, and a number of firms are erecting new plants and others find it necessary to build additions to the present ones in order to keep up with the demand. Log-driving in the Eastern provinces is making satisfactory progress and the saw and planing mills are making preparations for the operating of their plants at full capacity, some of which will find it necessary to build additions and make repairs and install new equipment in their plants.

The future of the textile industry never appeared brighter than it does at the present time. On account of the high price of silver mining operations around the Cobalt district are becoming exceedingly active, and not a few of the companies are building additions to their plants and installing considerable new machinery.

The Hollinger Mine, Timmins, Ont., is building an addition to its plant and will require machinery which will cost in the neighborhood of $750,000.

The American Cynamid Company, Niagara Falls, Ont., has awarded contract for the erection of a plant at Stamford, Ont., to cost $35,000.

A British order in council prohibiting the employment of aliens on munitions work, except under permit from the Minister of Munitions, was published in the *Canada Gazette*, at Ottawa, April 29.

There is a revival of interest in wooden shipbuilding in the maritime provinces. Nova Scotia has been more prompt in answering the call than New Brunswick, several large schooners being now in process of construction at Nova Scotia points. Most of the old shipyards at St. John, Black River, Gardiner's Creek, Quaco and other former shipbuilding localities, though in a dismantled state, are still available for the construction of wooden craft, and sufficient workmen are available in the Province conversant with shipbuilding to ensure good work if the industry were revived. Negotiations are now pending for the construction of a number of ocean-going barges. If the wooden shipbuilding industry were revived it would mean a great deal for the maritime provinces and might ultimately lead to the establishment of a steel shipbuilding plant. Colonel Cantley, president of the Nova Scotia Steel & Coal Company, New Glasgow, N. S., announced a short time ago that his company is considering the establishing of a large shipbuilding industry in connection with its plant, provided that sufficient encouragement is received from the Government.

It is reported that the Canada Cement Company, Montreal, is negotiating for another order for munitions with the Imperial Munitions Board. The first order received by the company was for $7,000,000.

The Watrous Engine Works, Brantford, Ont., whose men went on strike some time ago, have returned to work, a settlement having been reached.

Fire caused $25,000 damage at the plant of the Western Drydock & Shipbuilding Company, Port Arthur, Ont., according to R. B. Wallace, manager. Patterns accumulated the past five years were destroyed.

The International Nickel Company of New York, is negotiating for a site at Hamilton for the erection of its large Canadian refining plant. It was reported some time ago that the Nickel Company would establish its plant at Hamilton on condition that the Hamilton By-Product Coke Oven Company, Ltd., was to erect a plant there, in order to secure a sufficient supply of fuel for the refinery. It is now reported that the coke company will commence shortly on the erection of its plant. P. B. Byrnes, president United States Gas & Fuel Company, is stated to be at the head of the new coke company.

The Rudkins Brass & Iron Company, Peterborough, Ont., is now operating under the managership of William Rudkins. The company is doing considerable business. It will shortly install considerable additional machinery in its foundry and work will be carried on on a much larger scale.

The International Tool Steel Company's building at Port Hope, Ont., has been taken over by a new company, of which Mr. Brandon is president. It agrees to put the building in repair and commence manufacturing within a year.

The Benedict-Proctor Mfg. Company, Alliston, Ont., is in the market for a 50-hp. engine and a 75 or 80-hp. boiler.

R. M. Hazelwood, Clifford, Ont., is in the market for an up-to-date automatic engine.

The Sudbury Nickel Refineries, Ltd., Ottawa, Ont., has been incorporated with a capital stock of $5,000,000 by J. P. Burrows, Edward Seybold, W. C. Perkins, and others. The company has the patent rights to a new process of nickel refining, and is preparing to establish a plant.

R. S. Kelsch, consulting engineer, Power Building, Montreal, Que., is sending out specifications for a 1000-kw. generator to be installed in the Canadian Cotton Company's plant at Cornwall, Ont. The company will change its Stourmount mill from rope and belt drive to motor drive throughout.

It is reported that the Rumely Tractor Company, Calgary, Alberta, will build a tractor garage to cost $30,000.

The Russell Motor Company, West Toronto, Ont., has purchased 28 acres of the Trethewey Farm, a short distance from Weston, Ont, on which it will erect a plant to manufacture cycles and skates. The plant will cost $100,000. In the past these branches of the company's business were handled in connection with its motor car plant at West Toronto. This plant has recently been turned over to the Willys-Overland Company of Canada, which requires the whole premises for its business. The Russell Company is handling its fuse contracts at its plant on Dufferin Street. T. A. Russell is president. H. D. Scully will become secretary of the Russell Motor Car Company, Ltd., and also secretary and a director of the Canada Cycle & Motor Car Company, Ltd., a subsidiary of the Russell Company.

The Intercolonial Railway Company will erect a new elevator at St. John, N. B., at a cost of $500,000, to replace the one destroyed by fire some time ago.

Sudbury, Ont., will have a brick power station erected on David Street at a cost of $15,000. Victor L. Morgan, Wilson-Greenwood Block, is the architect.

Sherwood & Sherwood, Mail Building, Toronto, have received the contract for the erection of a plant for the McKinnon Dash & Hardware Company on Ontario Street, St. Catharines, Ont., at a cost of $75,000.

An addition is being built to the machine shop of J. T. Hepburn, Ltd., 18 Van Horne Street, Toronto, at a cost of $3,500.

George V. Reid, commissioner, Weyburn, Sask., is receiving bids until June 1, for one 500-kw. steam turbine, generator, switchboard and auxiliaries.

The Dominion Sheet Metal Company, Ltd., Hamilton, Ont., manufacturer of galvanized sheets, etc., is erecting two additions 20 x 100 ft., and 40 x 80 ft., respectively, to its plant.

The board of control, Ottawa, is making preparation for the erection of a garage and civic repair shop. Norman H. H. Lett is clerk.

Basil Jones, care of W. A. Henderson & Co., Medicine Hat, Alberta, will receive bids until June 1 for the complete plant of the Alberta Ornamental Iron Company at Red Cliff, Alberta.

The Imperial Oil Company, Sarnia, Ont., has announced that the refining plant now under construction at Regina, Sask., will cost $1,500,000 instead of $500,000 as first stated. The machinery and material for this plant is now being purchased.

Further extensions will be made to the plant of the Canada Forge Company at Welland, Ont., to cost $50,000. The present addition is to be a steel and brick building 60 x 227 ft., with crane runway extension 150 ft. long, equipped with electric cranes and loading rack for the inspection and shipment of shells.

Mr. Landahl, Vancouver, B. C., has asked the Provincial Government to guarantee the bonds of a company in which he is interested, in return for which it will establish a steel foundry in Vancouver.

The Loomer Electric Company, Ltd., Winnipeg, has been incorporated with a capital stock of $10,000 by J. F. Loomer, W. Pechet, M. Triller and others to manufacture electrical equipment and to build and operate plants for generating electricity, light, heat, power, etc.

The Rumsey & Co., Ltd., Toronto, has been incorporated with a capital stock of $50,000 by Oscar H. King, 34 Gloucester Street, M. P. Van der Voort and others to manufacture toys, fancy goods, novelties, etc.

The Majestic Electric Company, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by John A. Campbell, 24 King Street West; Alexander L. McLennan, Richard E. Callahan and others to manufacture electric, gas or other heaters, stoves, etc.

The F. S. Carr Rubber Company of Canada, Ltd., Granby, Que., has been incorporated with a capital stock of $200,000 by James E. Day, 26 Adelaide Street West; John M. Ferguson, 46 St. Andrew Gardens; Joseph P. Walsh and others to manufacture rubber goods, automobile tires, etc.

The Rankin & Co., Ltd., Toronto, has been incorporated with a capital stock of $100,000 by E. W. Holmsted, 45 Beatty Avenue, Norman R. Kay and others.

Government Purchases

WASHINGTON, D. C., May 22, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, June 20, schedule 9654, for one 40-ton traveling crane for Puget Sound; on June 6, schedule 9655, for one 36-in. triple-geared lathe for Washington; schedule 9657, for one 18-in. turret lathe, two 1½ x 18-in. turret lathes, one milling machine and two two-spindle drill presses, all for Portsmouth; schedule 9672, for six Diesel type engines for Mare Island, date not set; schedule 9676, for two sets of main propelling engines for Brooklyn and Philadelphia, and two impulse type turbines for Boston, dates not set; schedule 9695, for one steam forging press for Brooklyn, date not set.

Proposals for motor generator sets, oxy-hydrogen generating outfits, etc., will be received until 10.30 a. m., June 9, under Panama circular 1044 by the purchasing officer of the Panama Canal, Washington.

The commissioners of the District of Columbia, Washington, will receive sealed proposals until 2 p. m. May 29 for two water-tube safety boilers.

The United States Reclamation Service, Denver, Col., will receive sealed proposals until 2 p. m. June 5 for furnishing and erecting power and pumping equipment for the Grandview irrigation district, Yakima Project, Washington.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, May 16, under schedule 9753, ordnance, class 46, f.o.b works—for one motor-driven air compressor and spare parts—the Norwalk Iron Works Company, $5,998.36; the Worthington Pump & Machinery Corporation, $5,100 and $6,746.